Customer Care Solutions
RH-23 Series Transceivers

Troubleshooting Instructions

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RF Troubleshooting

Introduction to RF troubleshooting

Measurements should be done using Spectrum analyzer with high-frequency high-impedance passive probe (LO-/reference frequencies and RF power levels) and Oscilloscope with a 10:1 probe (DC-voltages and low frequency signals).

The RF-section is build around one RF-ASIC (HELGO N500). For easier troubleshooting, this RF troubleshooting document is divided into sections.

Before changing HELGO, please check the following things: supply voltages are OK and serial communication coming from baseband to HELGO.

Please note that the grounding of the PA module is directly below PA-module so it is difficult to check or change. **Most RF semiconductors are static discharge sensitive!** So ESD protection must be taken care of duriong repair (ground straps and ESD soldering irons). HELGO and PA are moisture sensitive so parts must be pre-baked prior to soldering.

Apart from key components described in this document here are a lot of discrete components (resistors, inductors and capacitors) which troubleshooting is done by checking if soldering of the component is done properly (for factory repairs checking if it is missing from PWB). Capacitor can be checked for shortening and resistors for value by means of an ohmmeter, but be aware in-circuit measurements should be evaluated carefully.

Please be aware that all measured voltages or RF levels in this document are rough figures. Especially RF levels varies due to different measuring equipment or different grounding of the used probe. When using RF probe usually a good way is to use metallic tweezers to connect probe ground to PWB ground as close to measurement point as possible.

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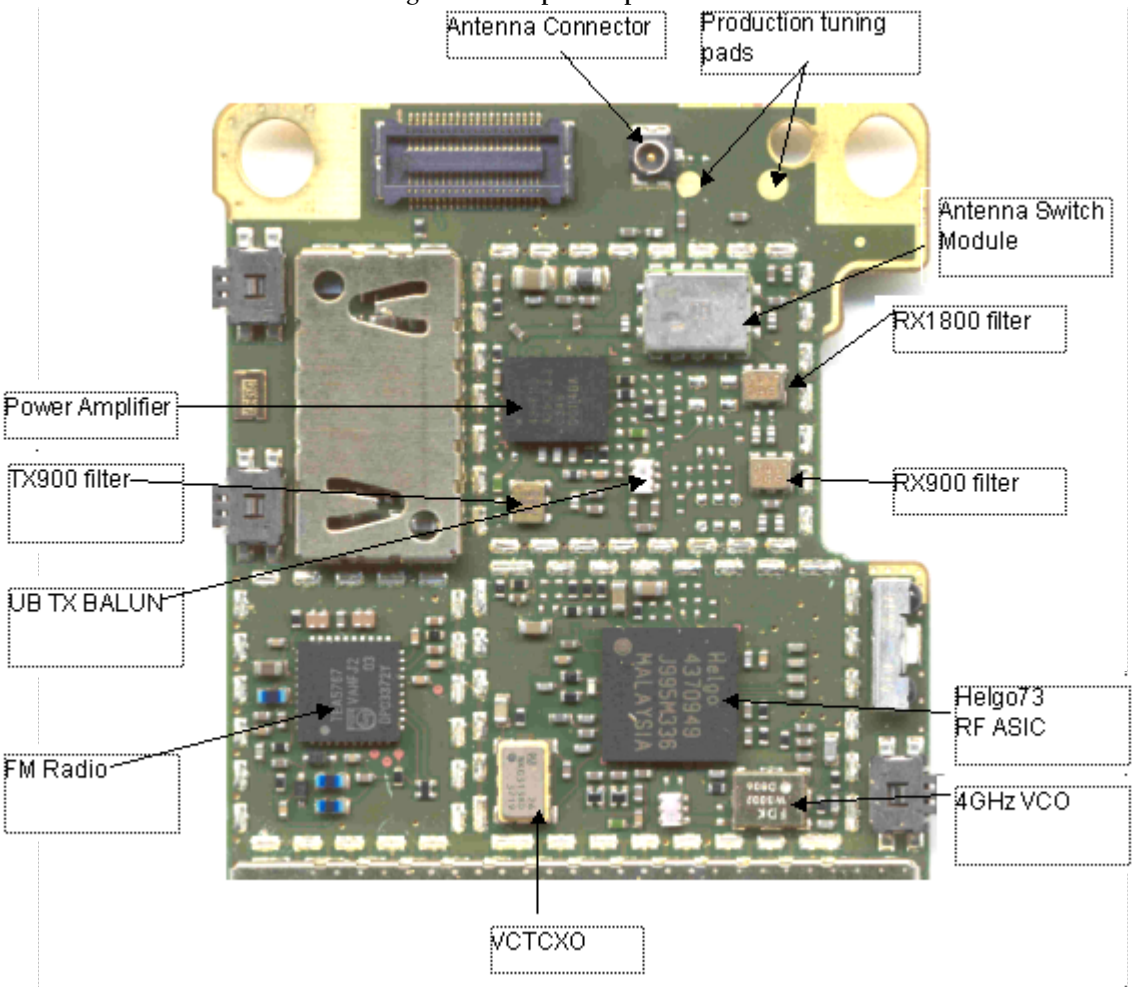
RF Key component placement

Figure 1: Component placement 1



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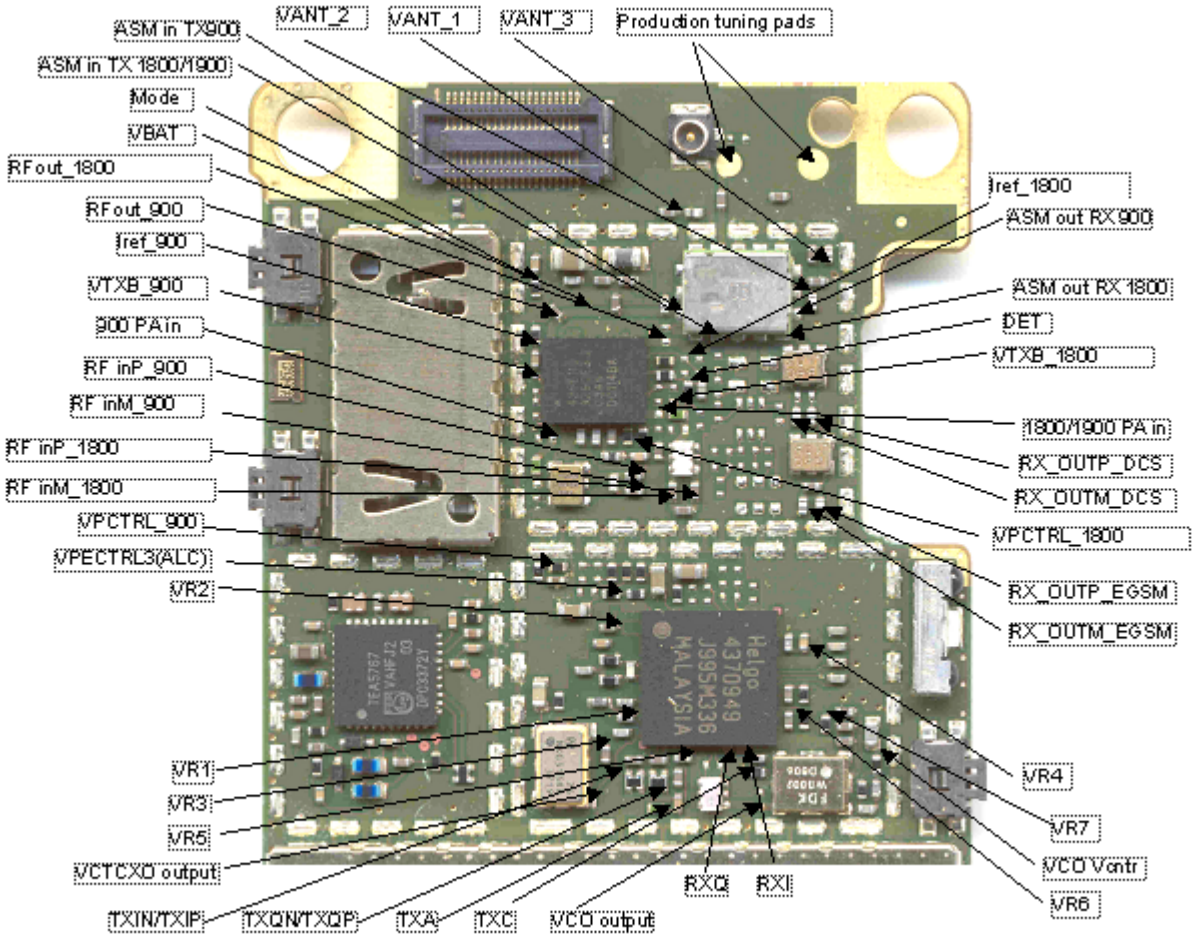
RF Measurement points

Figure 2: Component placement 2



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EGSM900 and GSM1800 Transmitter

General instructions for Tx troubleshooting

Kindly refer to the Service Software Section, Service Concept dagram (p.40)

Connect test jig to computer with DAU-9S cable or to FPS-8 Flash Prommer with XCS-4 modular cable.

Make sure that you have PKD-1 dongle connected to computers parallel port.

Connect DC power supply to module test jig with FLC-2 cable.

Attention: When repairing or tuning transmitter use external DC supply with at least 3A current capability. Set the DC supply voltage to 4.2V.

Connect an RF-cable to the module test jig (MJ-17) RF connector and to measurement equipment or at least a 10dB attenuator, otherwise the PA may be damaged. Normally a spectrum analyzer is used as measurement equipment.

Attention: Normally Spectrum analyzer maximum input power is +30dBm. It is recommended to use 10dB attenuator on Spectrum analyzer input to prevent damage.

Set the phone module to test jig and start Phoenix service sofware

Initialize connection to phone. (use FBUS driver when using DAU9S and COMBOX driver when using FPS-8)

Select product from the menu

File -> Choose product -> RH23/RH-33

From toolbar set operating mode to "Local"

Activate RF controls window from the menu

Testing -> RF Controls

From the RF controls window

- Select band "GSM900" or "GSM 1800" (Default = "GSM900")

- Set Active unit to "Tx" (Default = "Rx")

- Set Operation mode to "Burst" (Default = "Burst")

- Set Tx data type to "Random" (Default = "All1")

- Set Rx/Tx channel to 37 on GSM900 band or 700 on GSM1800 band (Defaults)

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- Set Tx PA mode to "Free" (Default)

- Set power level to 5 (Default = 19) on GSM900 or to 0 (Default = 15) on GSM1800

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Transmitter troubleshooting diagram

Figure 3: Transmitter troubleshooting

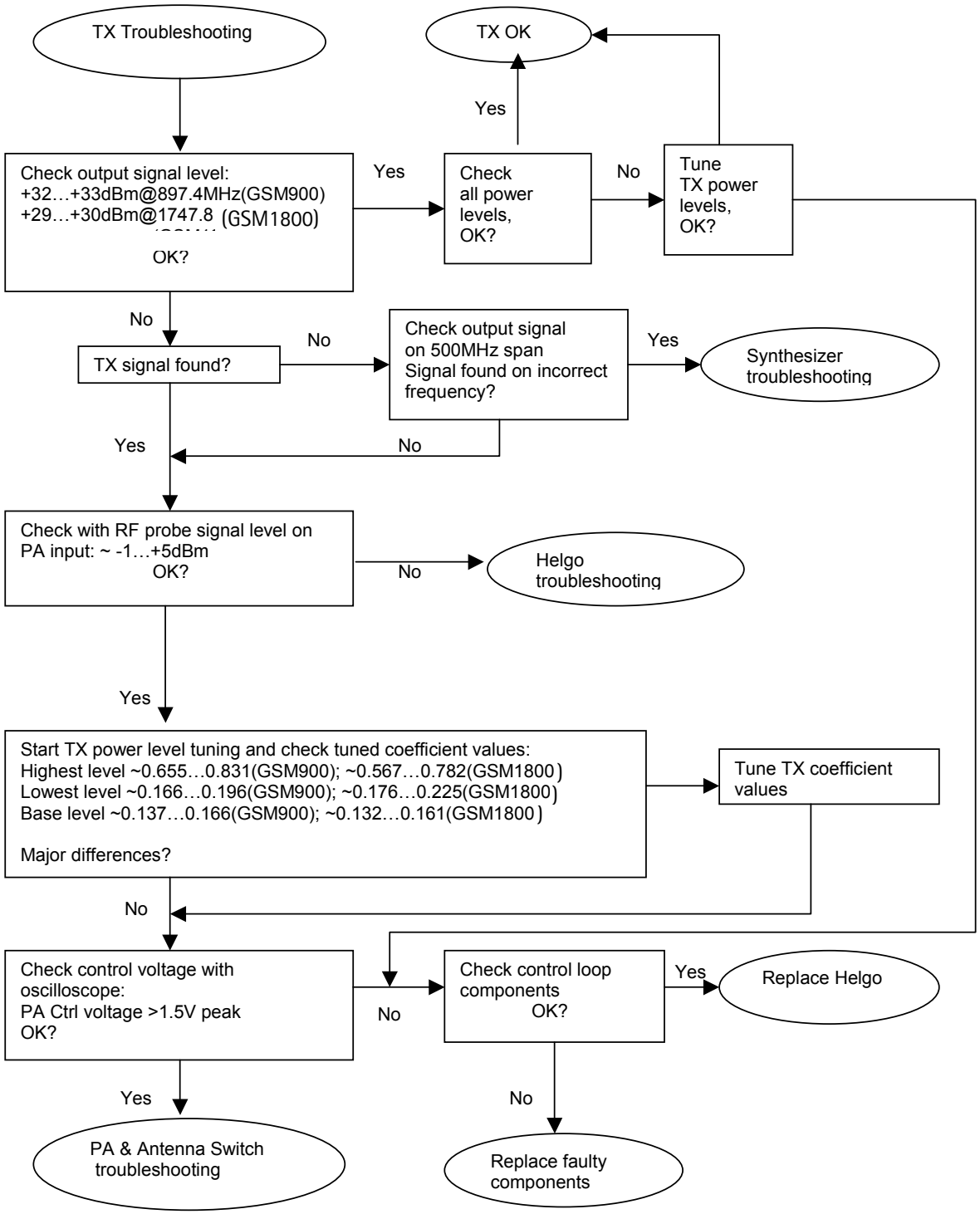

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Figure 4: HELGO IC troubleshooting

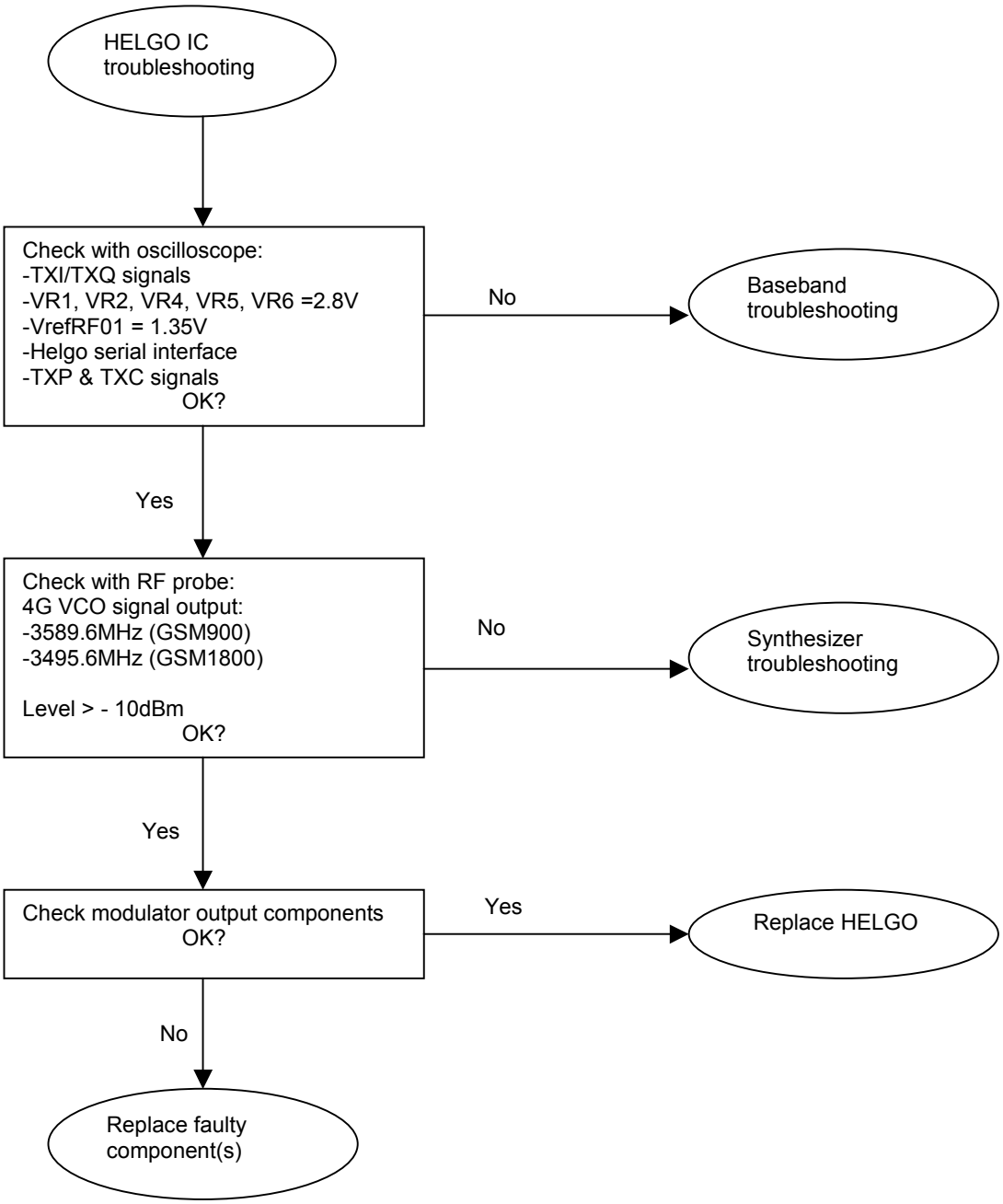
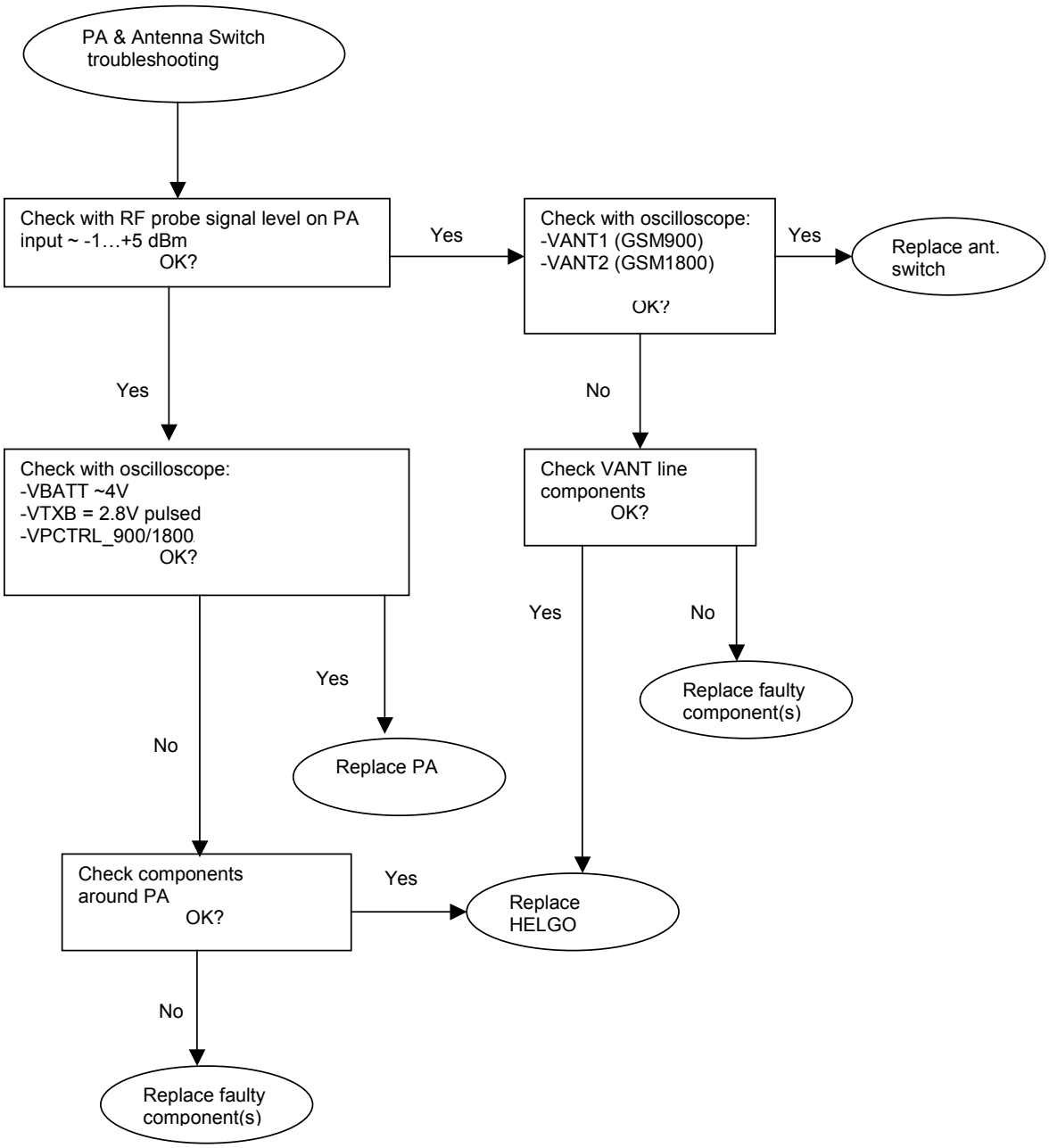


Figure 5: PA and Antenna Switch troubleshooting



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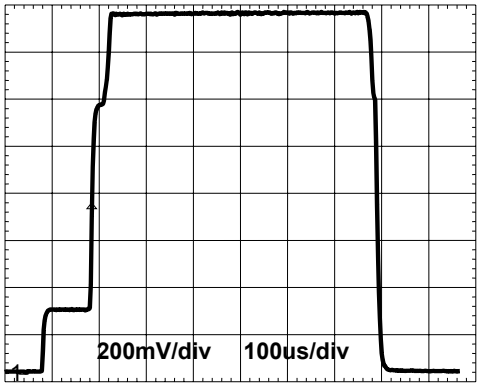
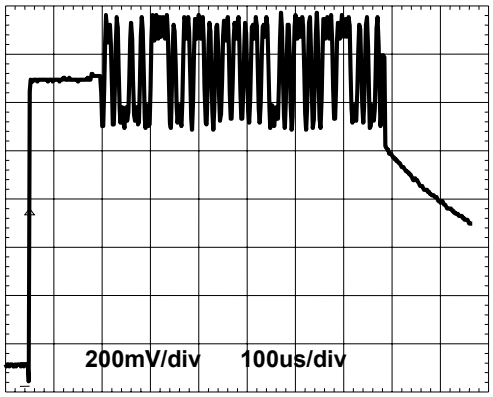
Pictures of transmitter signals

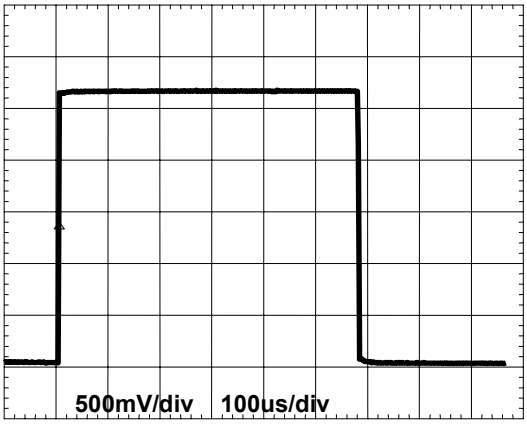
Figure 6:



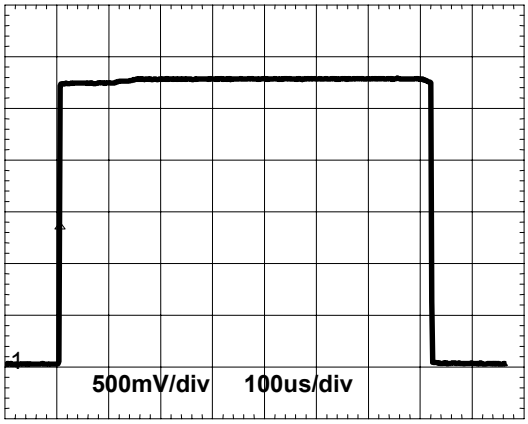
VPCTRL _900 power level high at R703/C703
VPCTRL_1800 power level high at R704/C704_



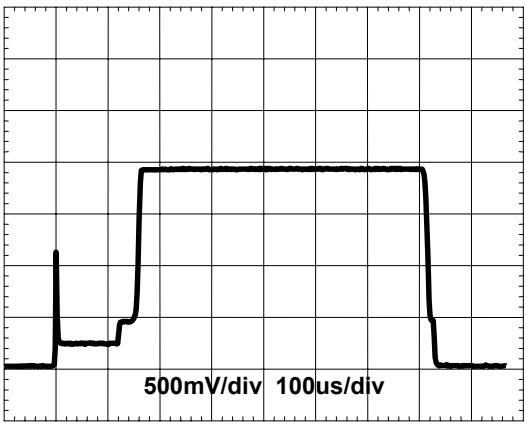
X I/Q at R516/517 power level high Random data



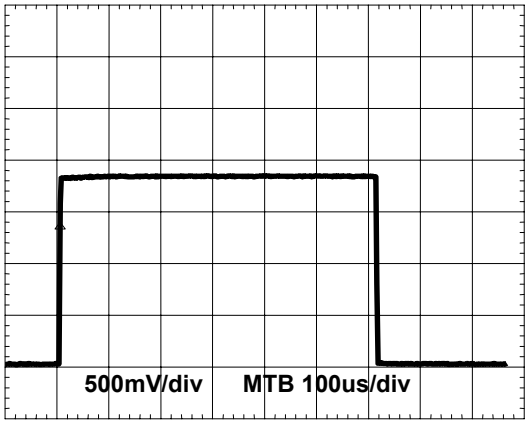
VANT_1 / GSM900 TX at C805
VANT_2 / GSM1800 TX at R804
(no signal/ Flatline on Oscilloscope screen)



VANT_1,VANT_2,VANT_3

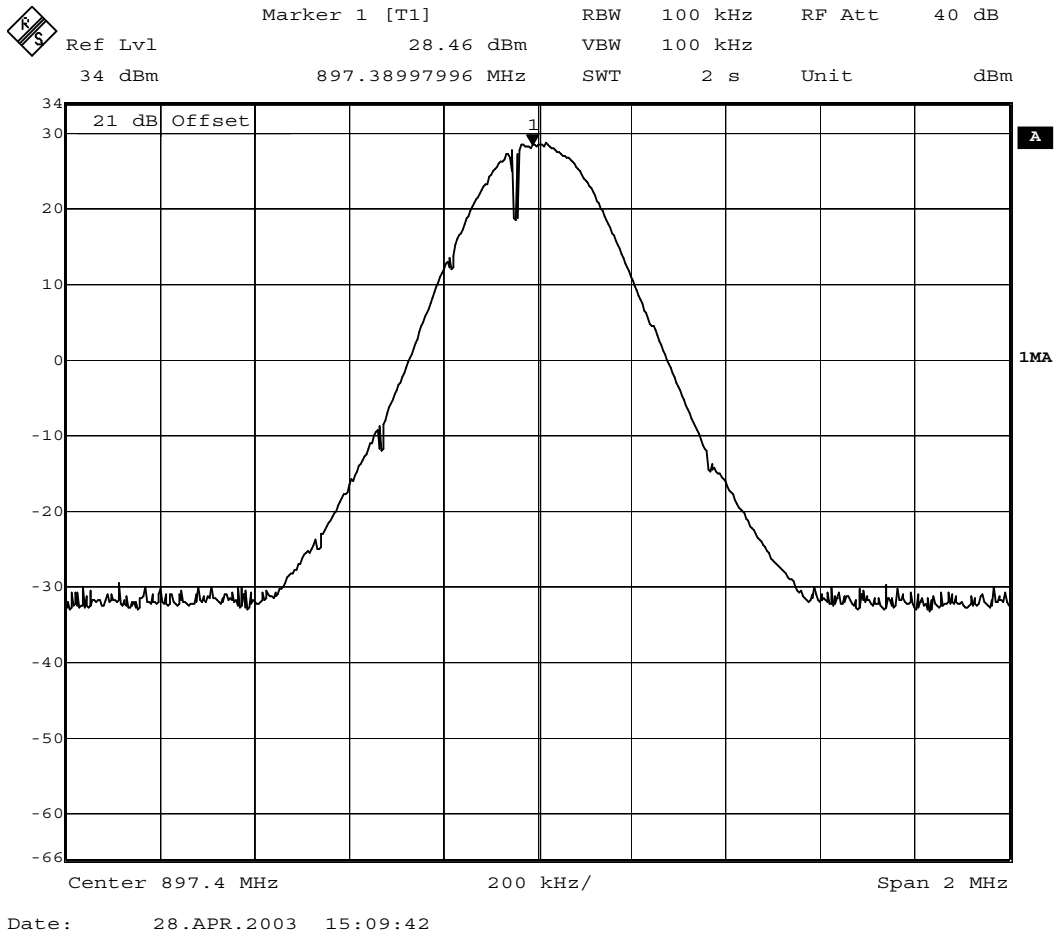


VTXB_900 at C713
VTXB_1800 at C714



TXP at J504

Figure 7: Tx out signal, 900 band, burst mode, channel 37



Additional information for EDGE troubleshooting

EDGE mode troubleshooting differs slightly from basic GSM troubleshooting.

Establish connection to the phone normally (see GSM900/1800 troubleshooting instructions).

Select product from the menu:

File -> Choose Product -> RH23/RH-33

From toolbar set operating mode to "Local"

Activate RF controls window from the menu:

Testing -> RF Controls

From the RF controls window:

Select Band "GSM900" or "GSM1800" (Default="GSM900")

Set Active unit to "Tx" (Default="Rx")

Set Edge "On" (Default="Off")

Set Operation mode to "Burst" (Default="Burst")

Set Tx data type to "Alternate PN9" (Default="All1")

Set Rx/Tx channel to 37 on GSM900 or 700 on GSM1800 (Defaults)

Set power level to 8 (Default = 19) on GSM900 or to 2 (Default = 15) on GSM1800

NOTE! For GSM900 Edge power levels 5, 6 and 7 are not in use and for GSM1800 Edge power levels 0 and 1 are not in use.

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Figure 8: Transmitter EDGE troubleshooting

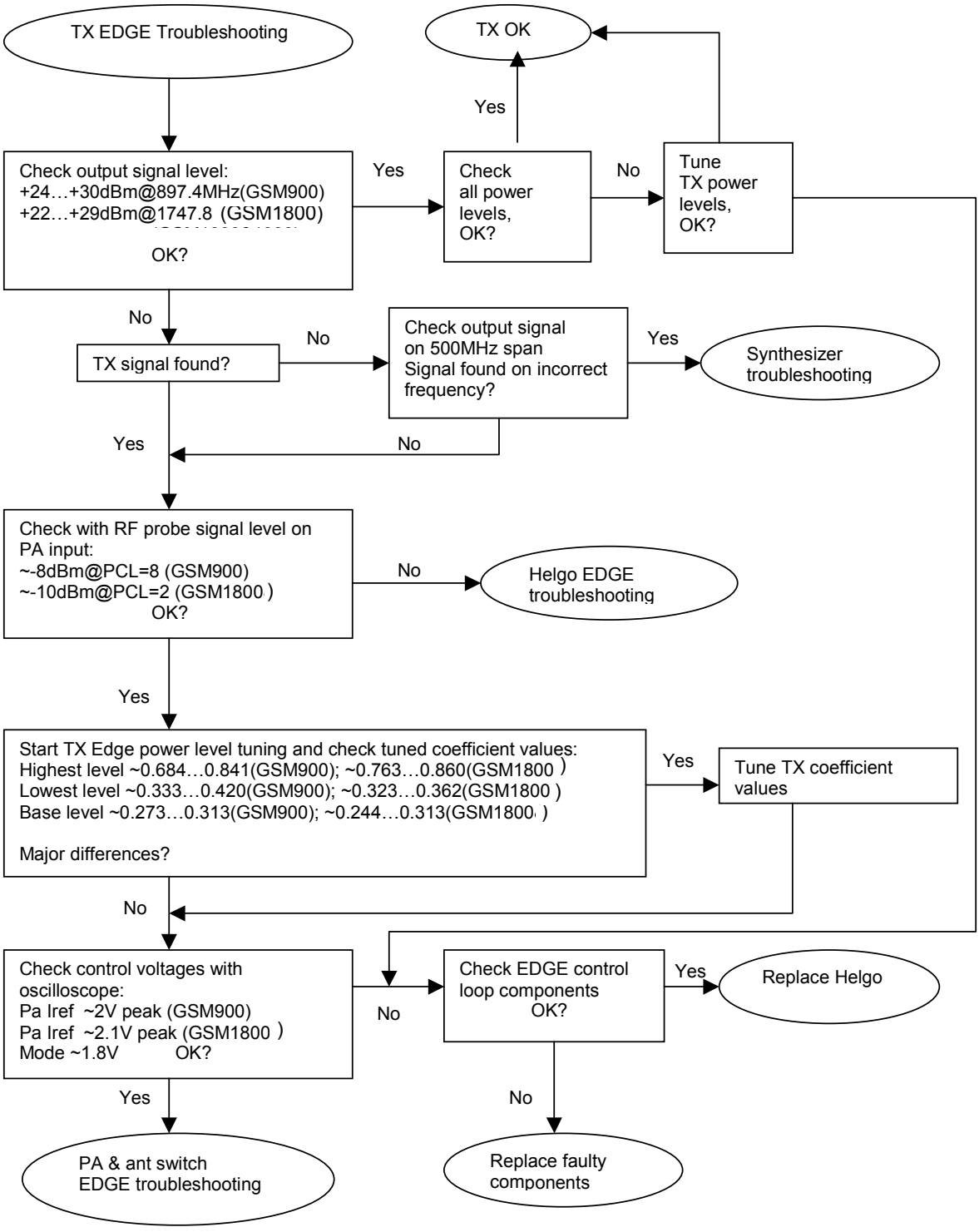

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Figure 9: Helgo EDGE troubleshooting

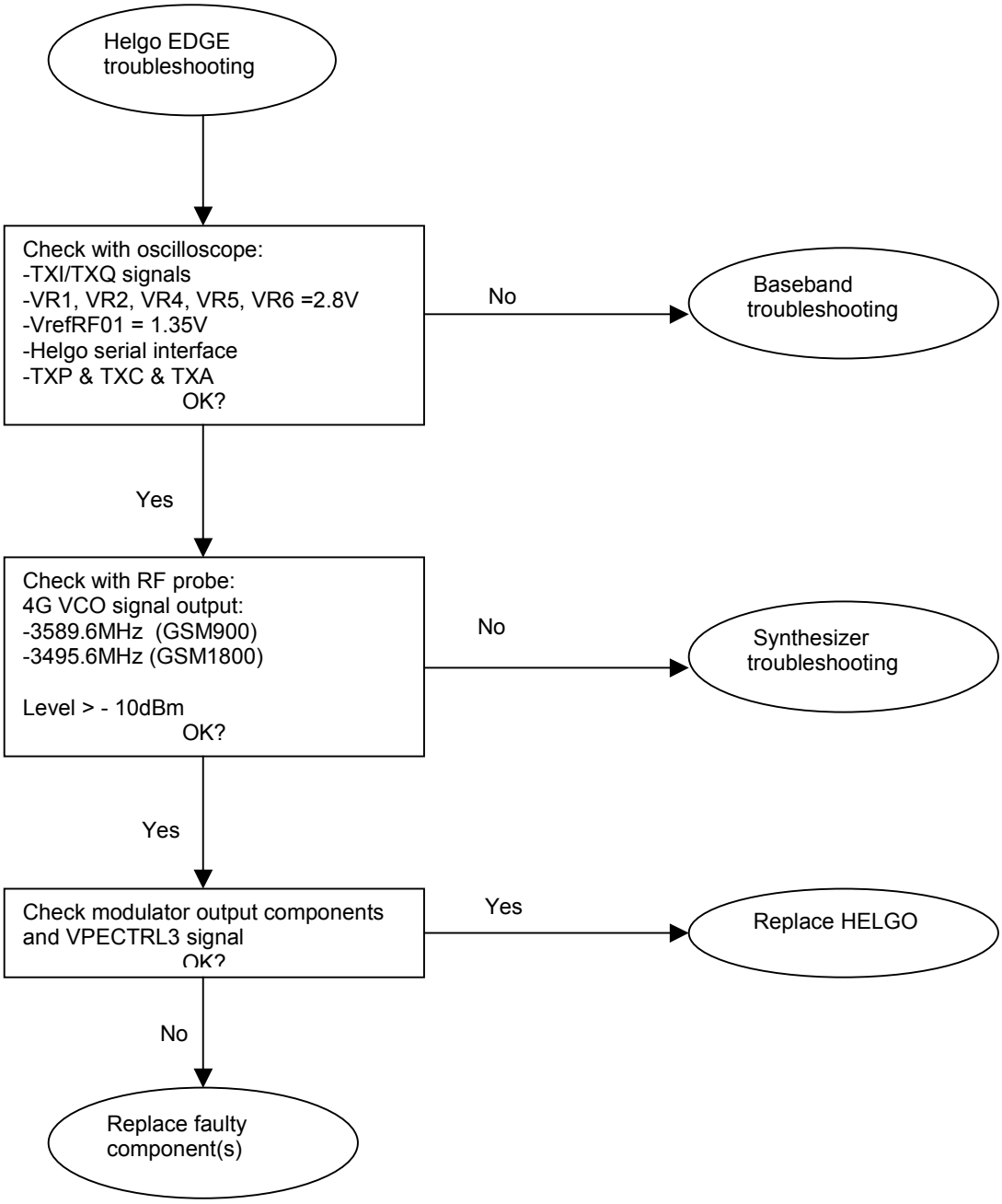
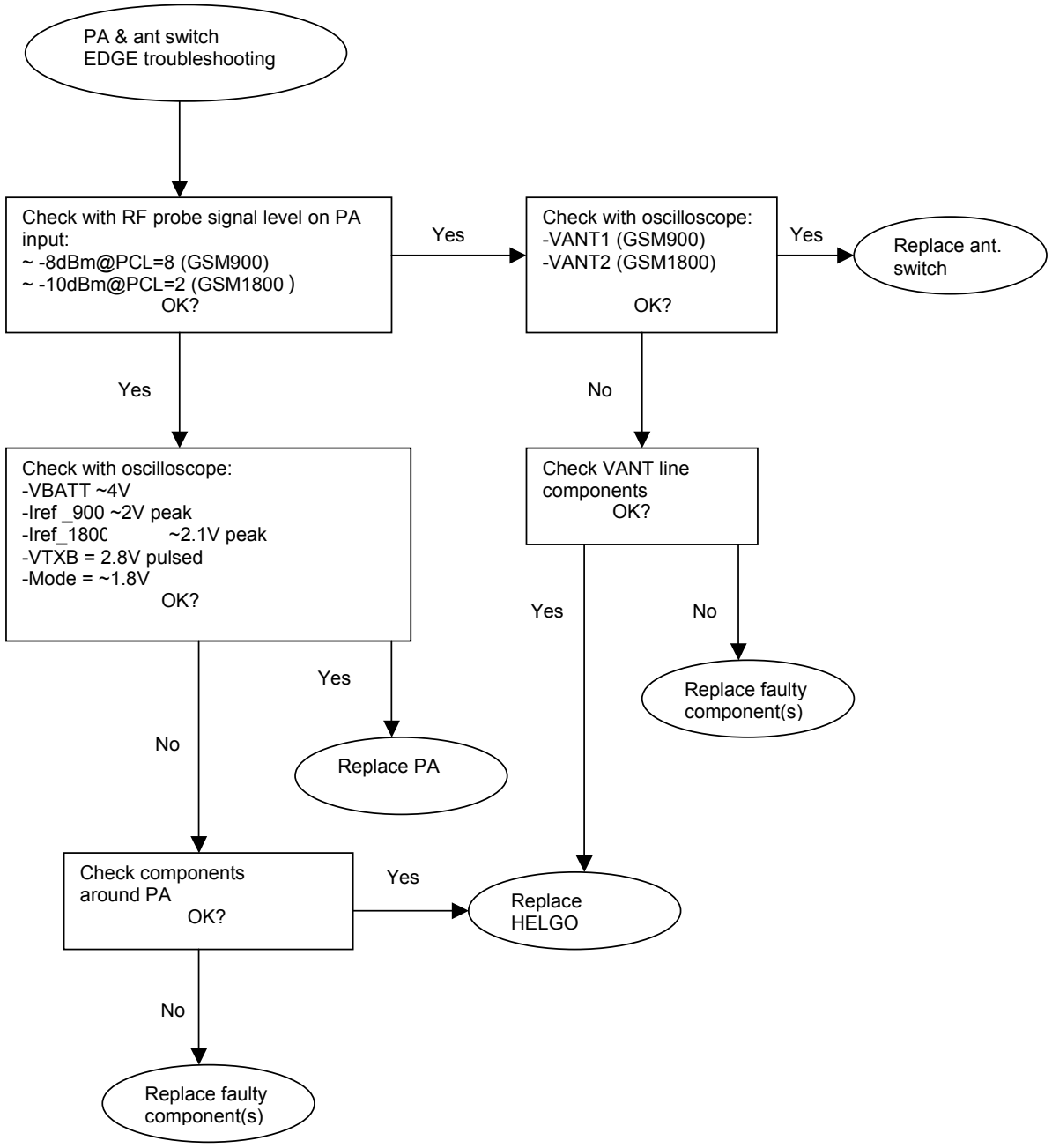


Figure 10: Pa & ant switch EDGE troubleshooting



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Pictures of EDGE transmitter signals

Figure 11: I_ref_900 power level 8 at R712/C726

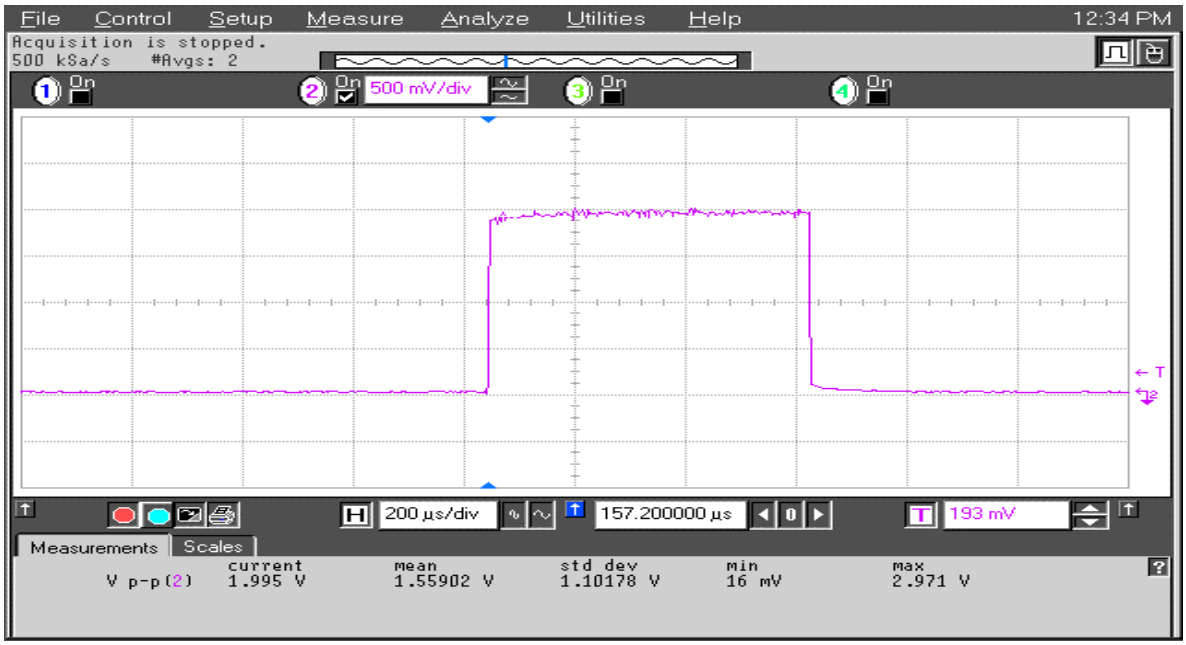
File Control Setup Measure Analyze Utilities Help
12:34 PM
Acquisition is stopped.
500 kSa/s #Avgs: 2
500 mV/div
200 µs/div
157.200000 µs
193 mV
Measurements Scales
current mean std dev min max
V p-p(2) 1.995 V 1.55902 V 1.10178 V 16 mV 2.971 V

Figure 12: VTXB 900 power level 8 at R718

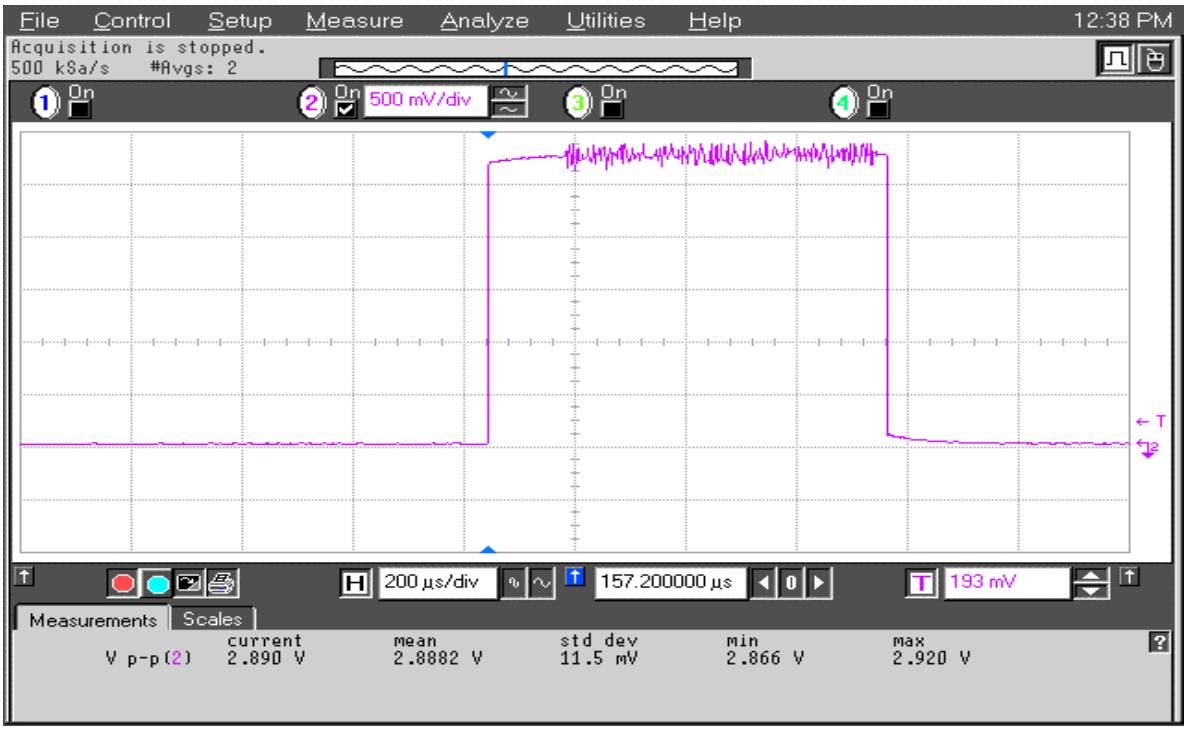
File Control Setup Measure Analyze Utilities Help
12:38 PM
Acquisition is stopped.
500 kSa/s #Avgs: 2
500 mV/div
200 µs/div
157.200000 µs
193 mV
Measurements Scales
current mean std dev min max
V p-p(2) 2.890 V 2.8882 V 11.5 mV 2.866 V 2.920 V

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Figure 13: I_ref_1800 power level 2 at R713/C727

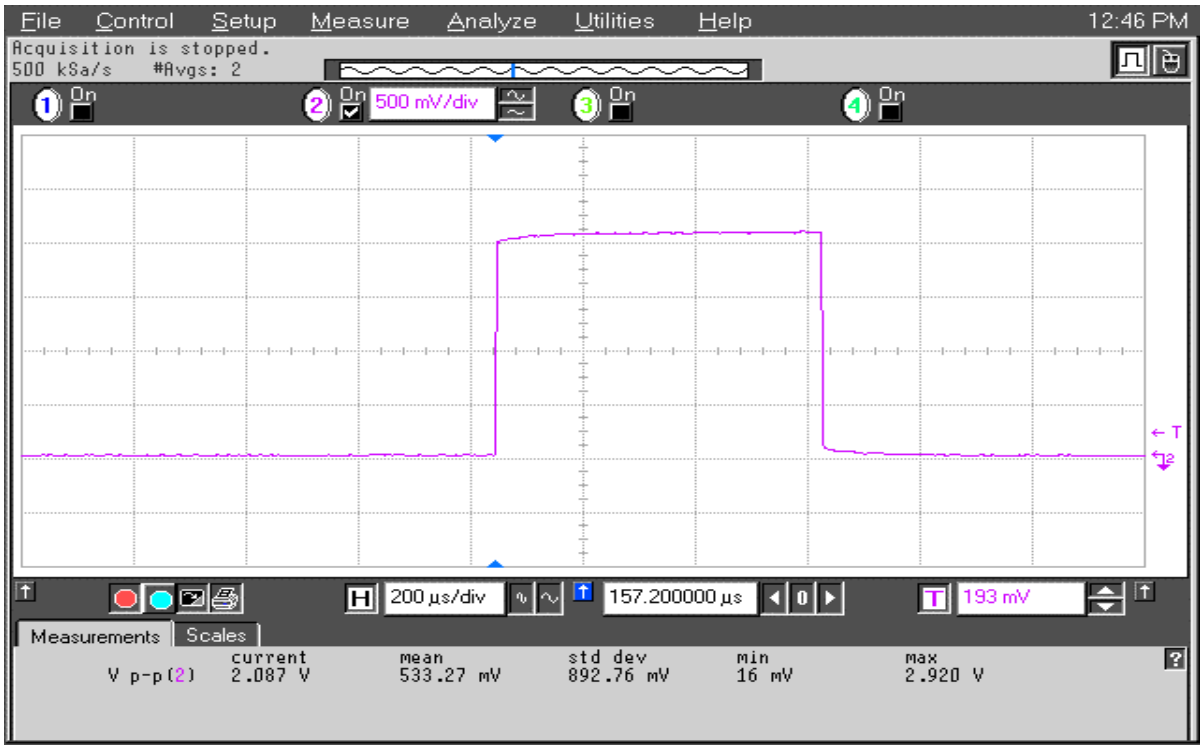

Figure 14: VTXB 1800 power level 2 at C717

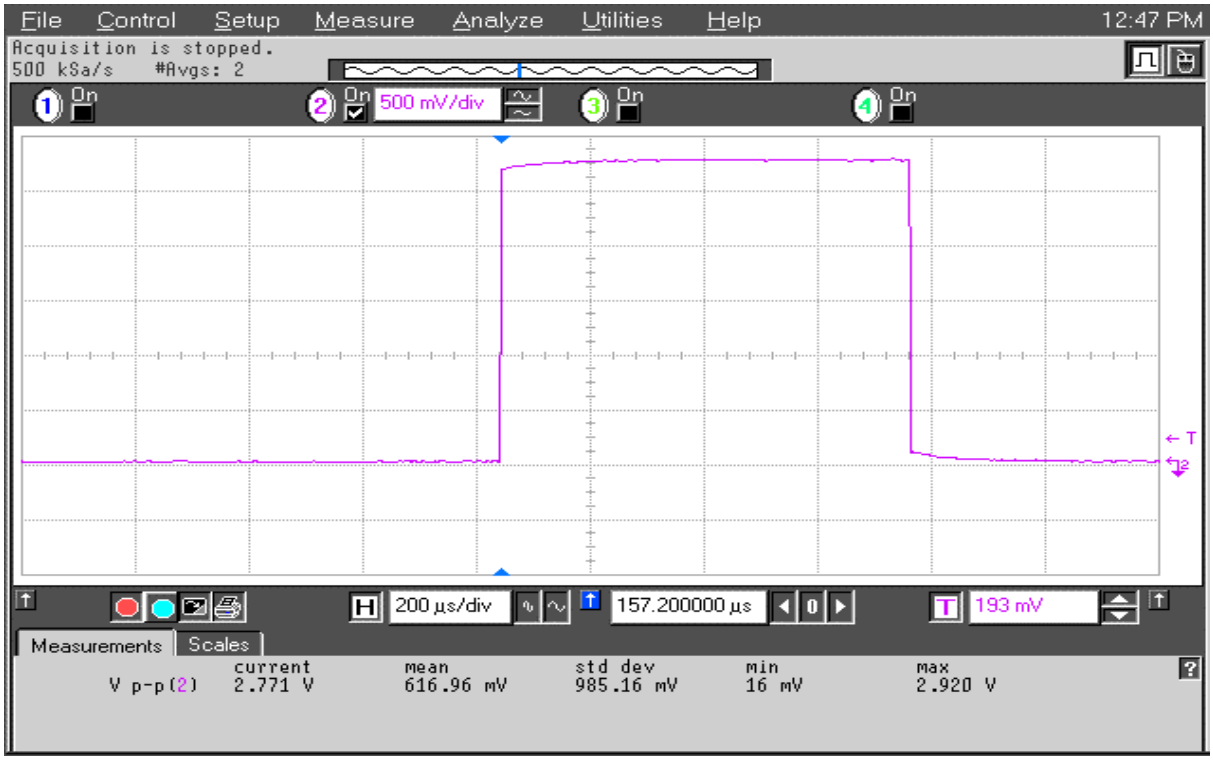

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Figure 15: TXA 900/1800 at C538

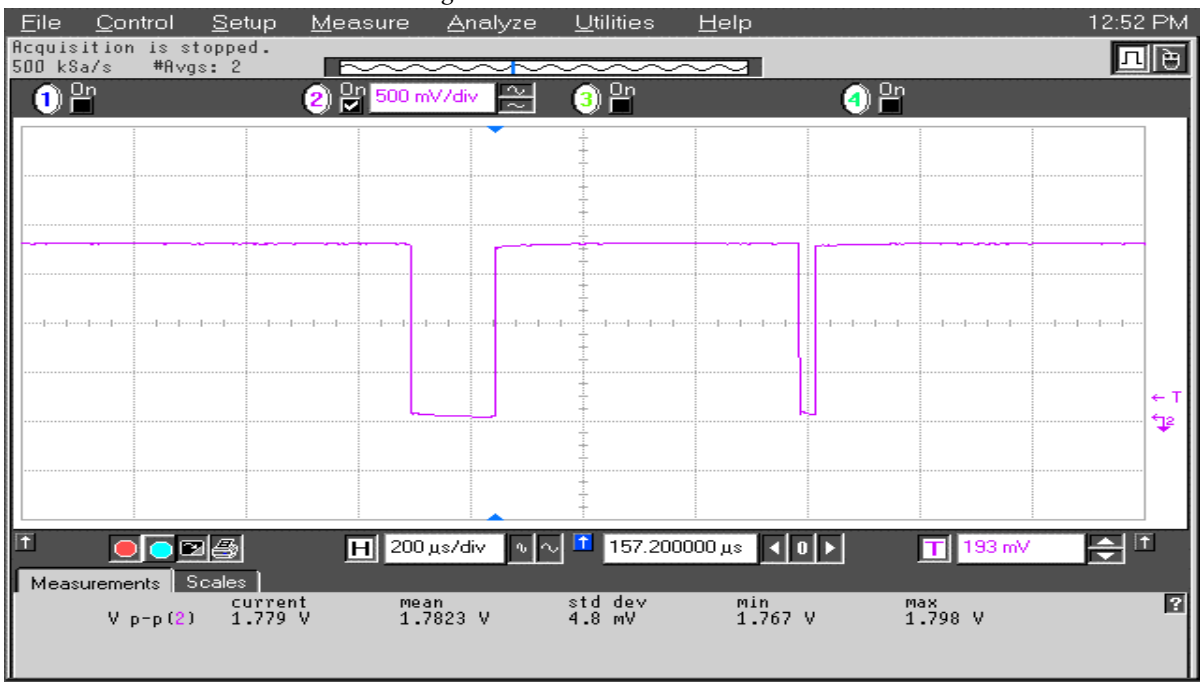

Figure 16: TXI/TXQ signal at C535/C536/R516/R517

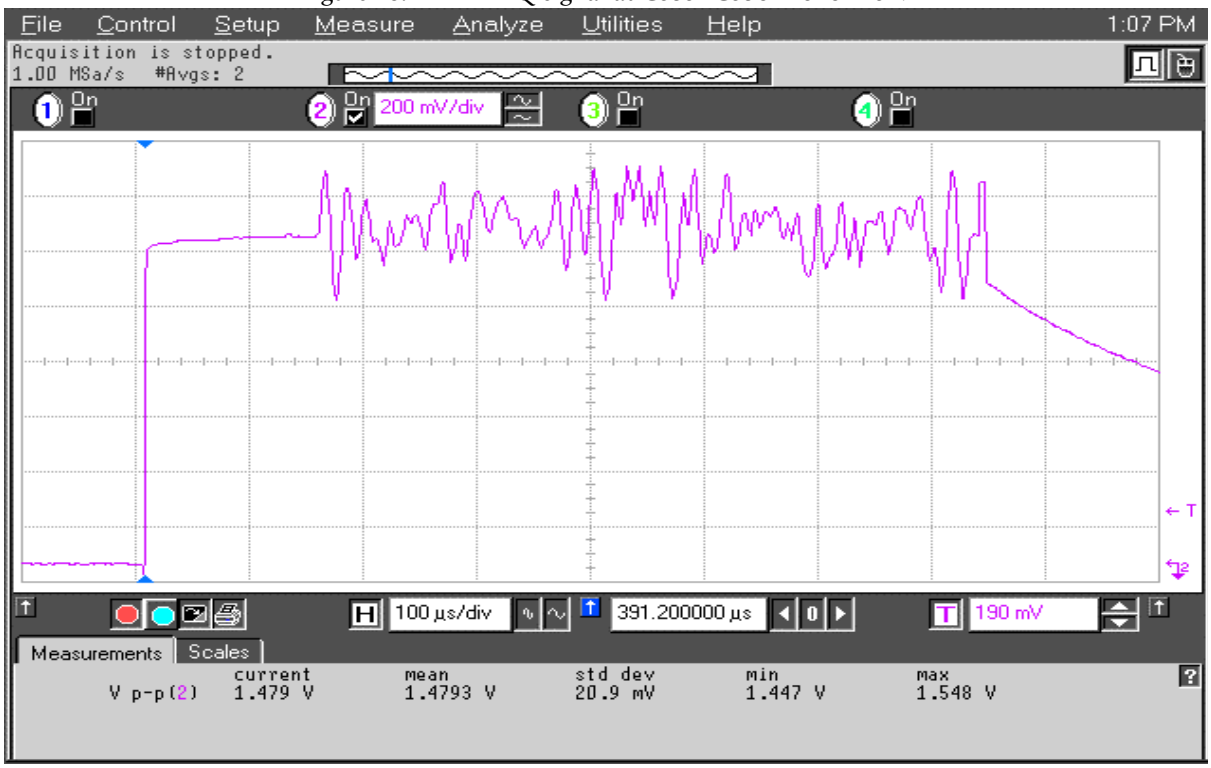

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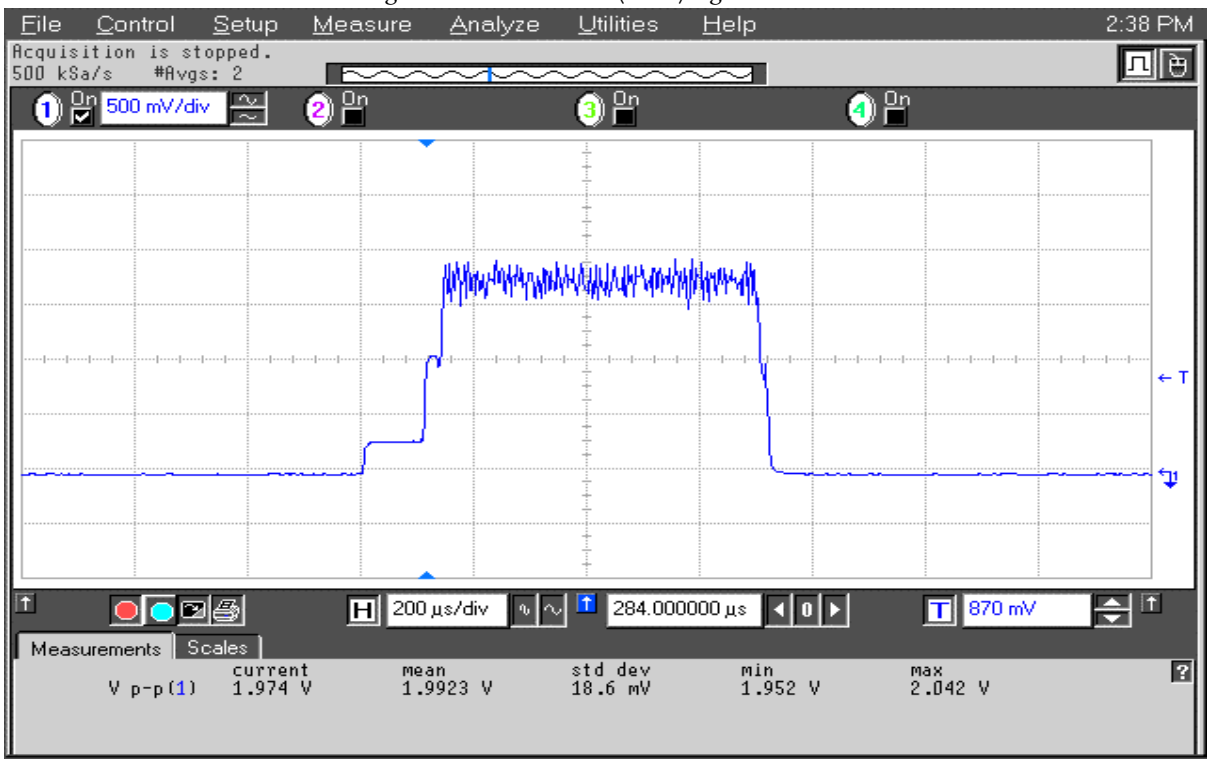
Figure 17: VPECTRL3 (ALC) signal at C512



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EGSM900 and GSM1800 Receiver

General instructions for Rx troubleshooting

Connect test jig to computer with DAU-9S cable or to FPS-8 Flash Prommer with XCS-4 modular cable.

Make sure that you have PKD-1 dongle connected to computers parallel port.

Connect DC power supply to module test jig with FLC-2 cable.

Set the DC supply voltage to 4.2V.

Connect an RF-cable to the module test jig (MJS-38) RF connector and to RF signal generator.

Set the phone module to test jig and start Phoenix service sofware.

Initialize connection to phone. (use FBUS driver when using DAU9S and COMBOX driver when using FPS-8)

Choose product from the menu

File -> Choose product -> RH23/RH-33

From toolbar set operating mode to "Local"

Activate RF controls window from the menu

Testing -> RF Controls

From the RF controls window:

- Select band "GSM900" or "GSM 1800" (Default = "GSM900")

- Set Active unit to "Rx" (Default = "Rx")

- Set Operation mode to "Burst" (Default = "Burst")

For continuous mode:

- Set Operation mode to "Continuous"

- Set AGC to "12: FEG_ON + DTOS_ON + BB_30=Vgain60" (maximum gain setting used in normal mode)

(Default = "14: FEG_ON + DTOS_ON + BB_42=Vgain72")

- Set Rx/Tx channel to 37 on GSM900 band, 700 on GSM1800 band (Defaults)

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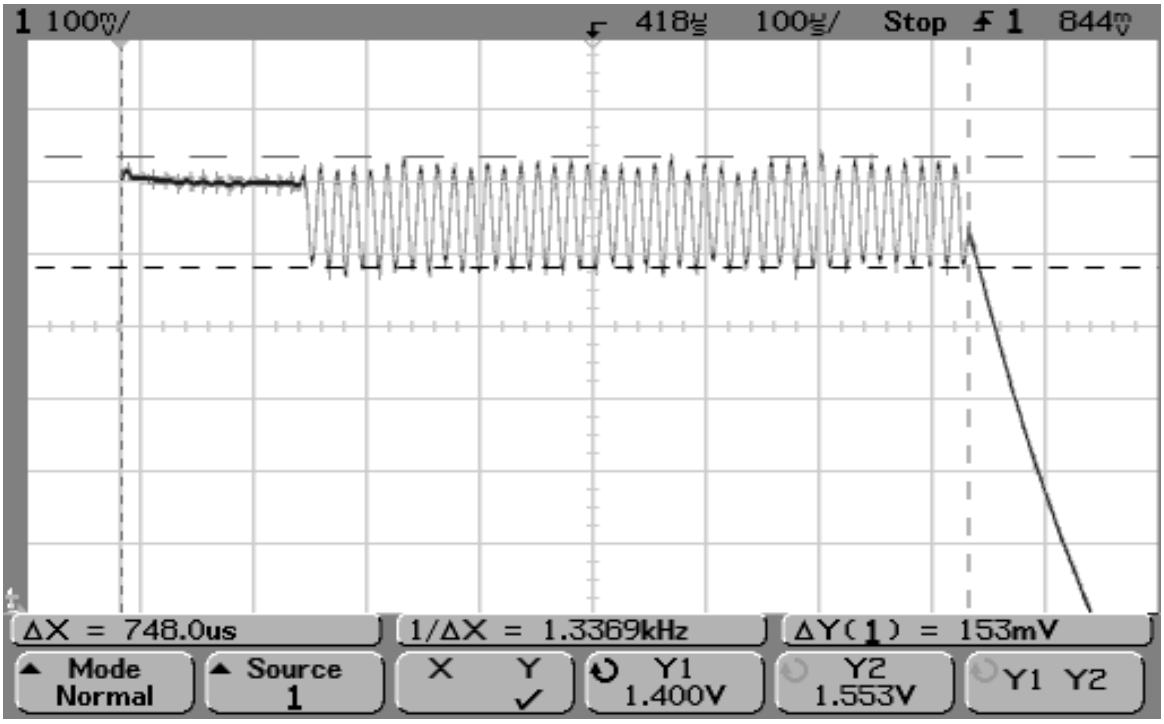
Apply 942.46771 MHz (channel 37 + 67.710 kHz offset), 1842.86771 MHz (channel 700 + 67.710 kHz offset) or 1960.06771 MHz (channel 661 + 67.71 kHz) –90 dBm signal to the RF-connector (remember to compensate for cable attenuation).

Measuring with an oscilloscope on "RXI" or "RXQ" following screens should be seen on a working GSM900 or GSM1800 receiver:

Figure 18: RX I/Q signal ,burst mode, input level –90dBm.



Receiver I or Q burst mode signal (channel 37) measured from testpoint RXI or RXQ with 942.46771 MHz signal, input level –90dBm at RF-connector.

Correct signal amplitudes approximately:

- GSM900~170mVpp
- GSM1800~140mVpp

Signal part frequency 67.7kHz sine.

DC level of signal part is 1.35V. DC level can variate about +/-100mV between I and Q signals and between different bands as well.

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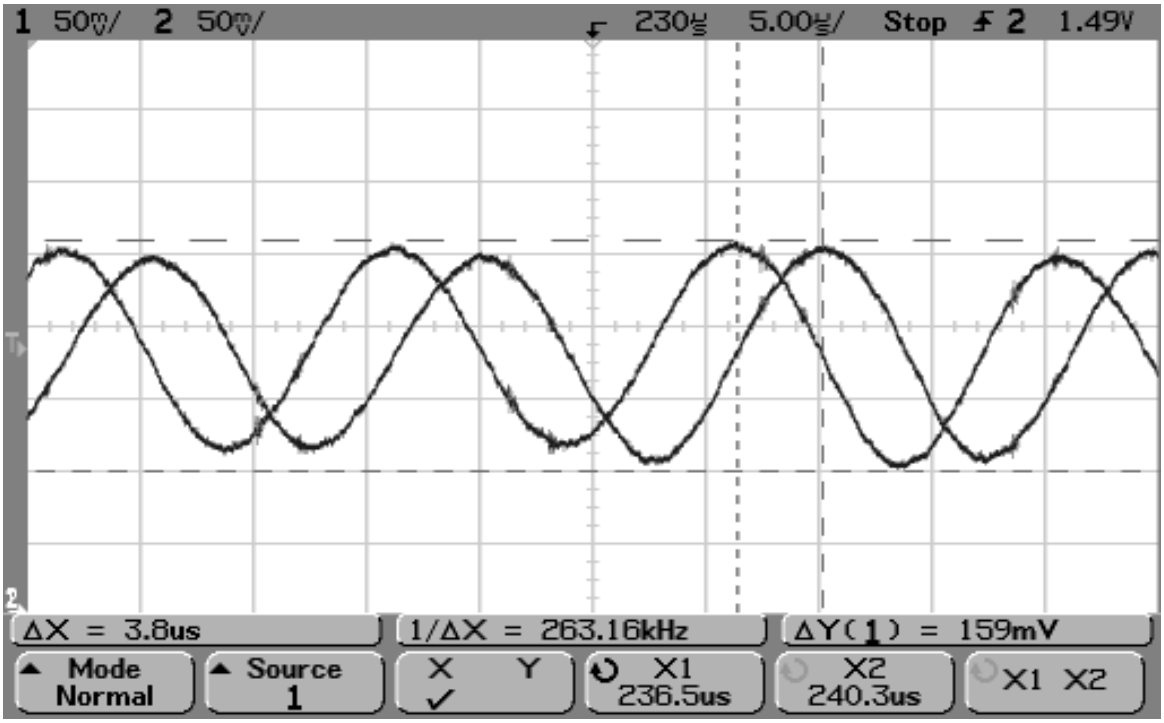
Figure 19: RX I&Q, phase difference 90 deg between signals.



Detailed view of GSM900 continuous mode RX I and Q signals measured from testpoints RXI and RXQ simultaneously.

Used channel 37, input signal 942.46771 MHz, level –90 dBm at antenna port, AGC setting 12.

Phase difference should be 90 degrees between RX I and Q signals at all bands.

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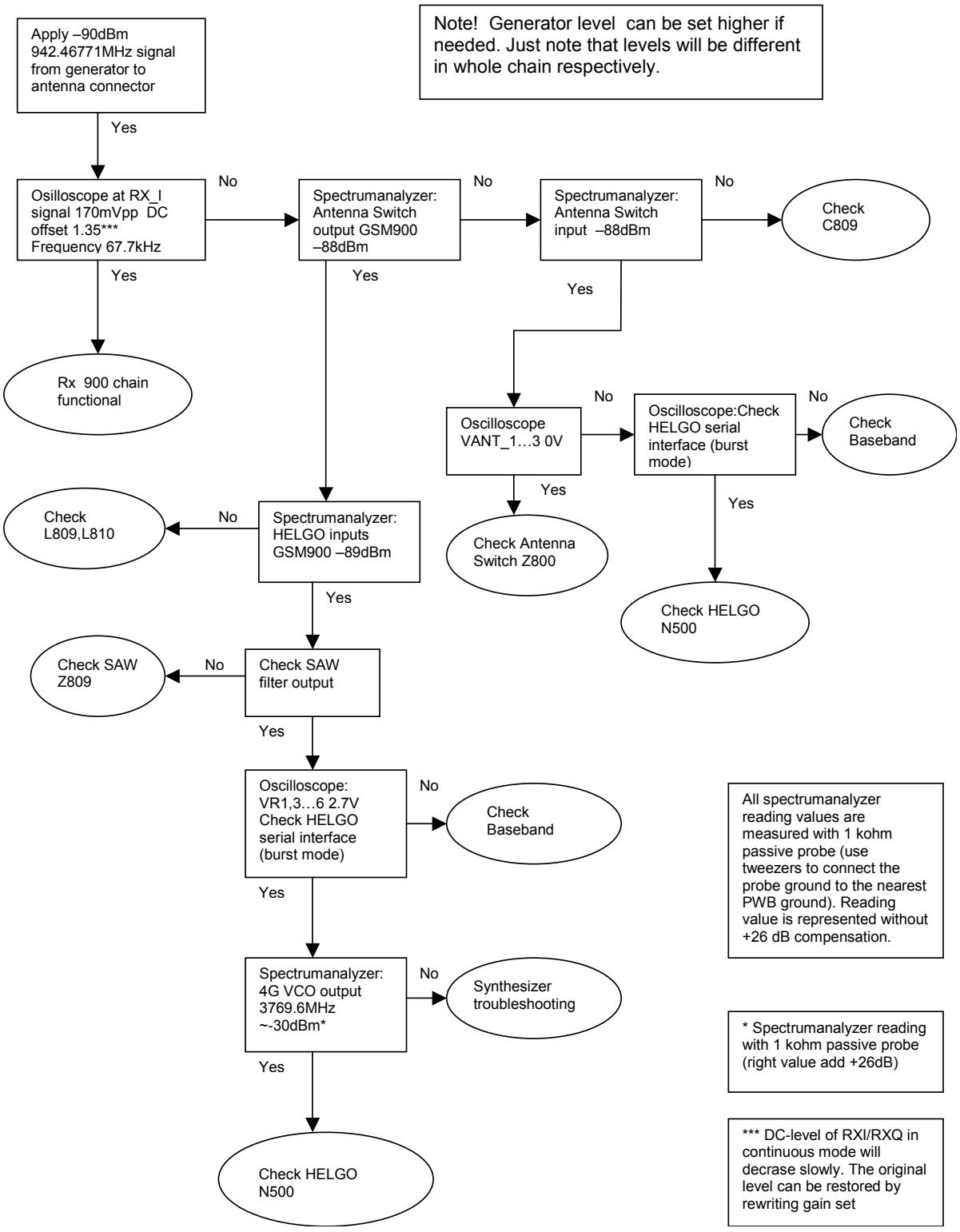
Troubleshooting diagram for GSM900 receiver

Phone in "Continuous" mode, AGC setting "12"

Figure 20: GSM900 receiver troubleshooting


Apply –90dBm 942.46771MHz signal from generator to antenna connector
Note! Generator level can be set higher if needed. Just note that levels will be different in whole chain respectively.
Yes
Osilloscope at RX_I signal 170mVpp DC offset 1.35*** Frequency 67.7kHz
No
Spectrumanalyzer: Antenna Switch output GSM900 –88dBm
No
Spectrumanalyzer: Antenna Switch input –88dBm
No
Check C809
Yes
Yes
Yes
Rx 900 chain functional
Oscilloscope VANT_1…3 0V
No
Oscilloscope:Check HELGO serial interface (burst mode)
No
Check Baseband
Yes
Yes
Check Antenna Switch Z800
Check HELGO N500
Check L809,L810
No
Spectrumanalyzer: HELGO inputs GSM900 –89dBm
Yes
Check SAW Z809
No
Check SAW filter output
Yes
Oscilloscope: VR1,3…6 2.7V Check HELGO serial interface (burst mode)
No
Check Baseband
Yes
Spectrumanalyzer: 4G VCO output 3769.6MHz ~-30dBm*
No
Synthesizer troubleshooting
Yes
Check HELGO N500
All spectrumanalyzer reading values are measured with 1 kohm passive probe (use tweezers to connect the probe ground to the nearest PWB ground). Reading value is represented without +26 dB compensation.
* Spectrumanalyzer reading with 1 kohm passive probe (right value add +26dB)
*** DC-level of RXI/RXQ in continuous mode will decrase slowly. The original level can be restored by rewriting gain set

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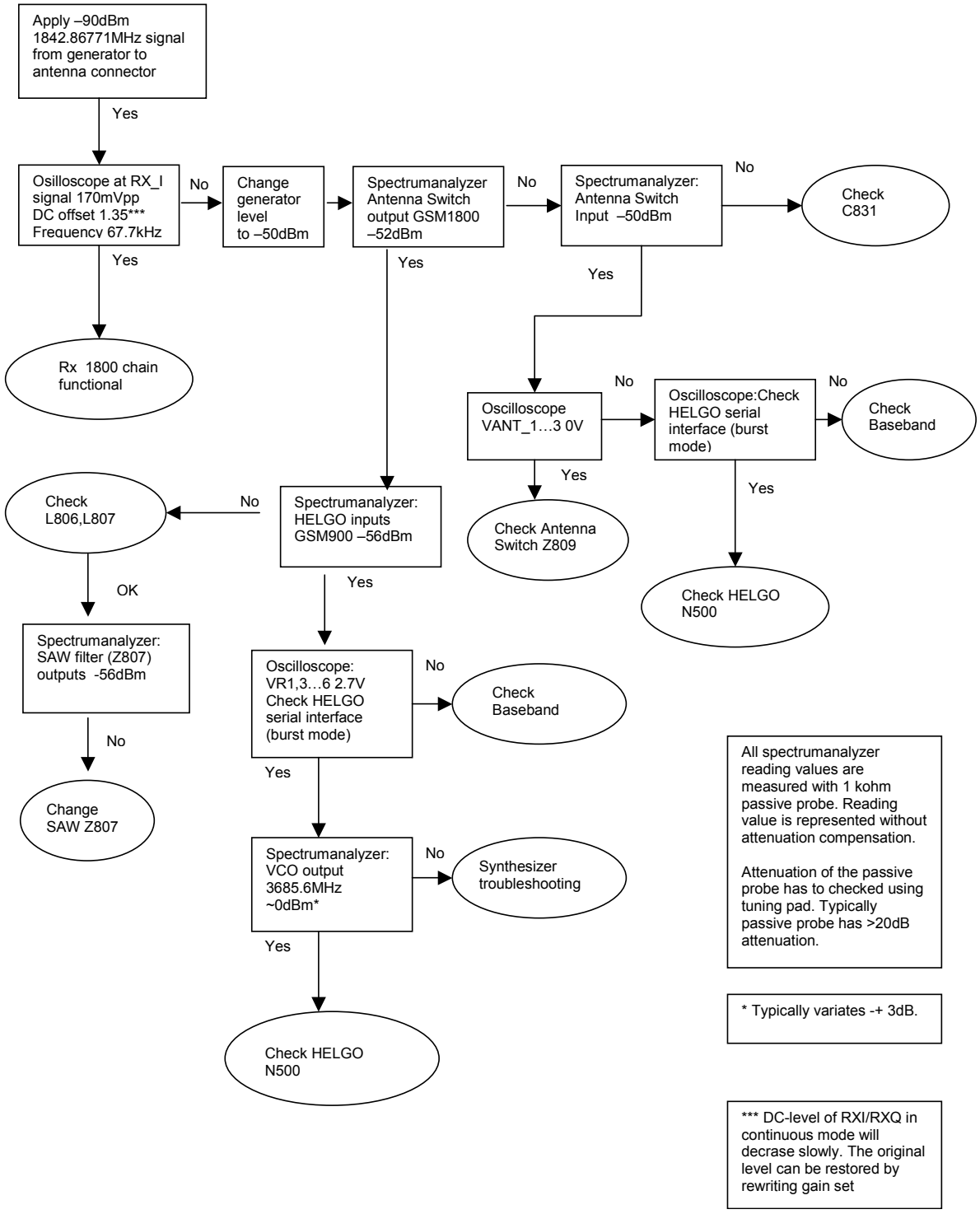
Troubleshooting diagram for GSM1800 receiver

Phone in "Continuous" mode, AGC setting "12

Figure 21: GSM1800 receiver troubleshooting


Apply –90dBm 1842.86771MHz signal from generator to antenna connector
Yes
Osilloscope at RX_I signal 170mVpp DC offset 1.35*** Frequency 67.7kHz
No
Change generator level to –50dBm
Spectrumanalyzer Antenna Switch output GSM1800 –52dBm
No
Spectrumanalyzer: Antenna Switch Input –50dBm
No
Check C831
Yes
Yes
Yes
Rx 1800 chain functional
Oscilloscope VANT_1…3 0V
No
Oscilloscope:Check HELGO serial interface (burst mode)
No
Check Baseband
Yes
Yes
Check Antenna Switch Z809
Check HELGO N500
Check L806,L807
No
Spectrumanalyzer: HELGO inputs GSM900 –56dBm
Yes
OK
Spectrumanalyzer: SAW filter (Z807) outputs -56dBm
Oscilloscope: VR1,3…6 2.7V Check HELGO serial interface (burst mode)
No
Check Baseband
No
Yes
Change SAW Z807
Spectrumanalyzer: VCO output 3685.6MHz ~0dBm*
No
Synthesizer troubleshooting
Yes
Check HELGO N500
All spectrumanalyzer reading values are measured with 1 kohm passive probe. Reading value is represented without attenuation compensation.
Attenuation of the passive probe has to checked using tuning pad. Typically passive probe has >20dB attenuation.
* Typically variates -+ 3dB.
*** DC-level of RXI/RXQ in continuous mode will decrase slowly. The original level can be restored by rewriting gain set

Synthesizer

General instructions for synthesizer troubleshooting

Connect test jig to computer with DAU-9S cable or to FPS-8 Flash Prommer with XCS-4 modular cable.

Make sure that You have PKD-1 dongle connected to computers parallel port.

Connect DC power supply or FPS-8 to module test jig with PCS-1 cable.

Set the DC supply voltage to 3.9 V.

Set the phone module to test jig and start Phoenix service software.

Initialize connection to phone (use FBUS driver when using DAU-9S and COMBOX driver when using FPS-8).

Select product from the menu:

File -> Choose product -> RH 23/33

From toolbar set operating mode to “Local”.

Activate RF controls window from the menu:

Maintenance -> Testing -> RF controls

From the RF controls window:

Select Band “GSM900” or “GSM1800”

Set Active unit to “RX” (Default “RX”)

Set Operation mode to “Continuous” (Default “Burst”)

Set RX/TX channel to 37 on GSM900 and 700 on GSM1800 (Defaults).

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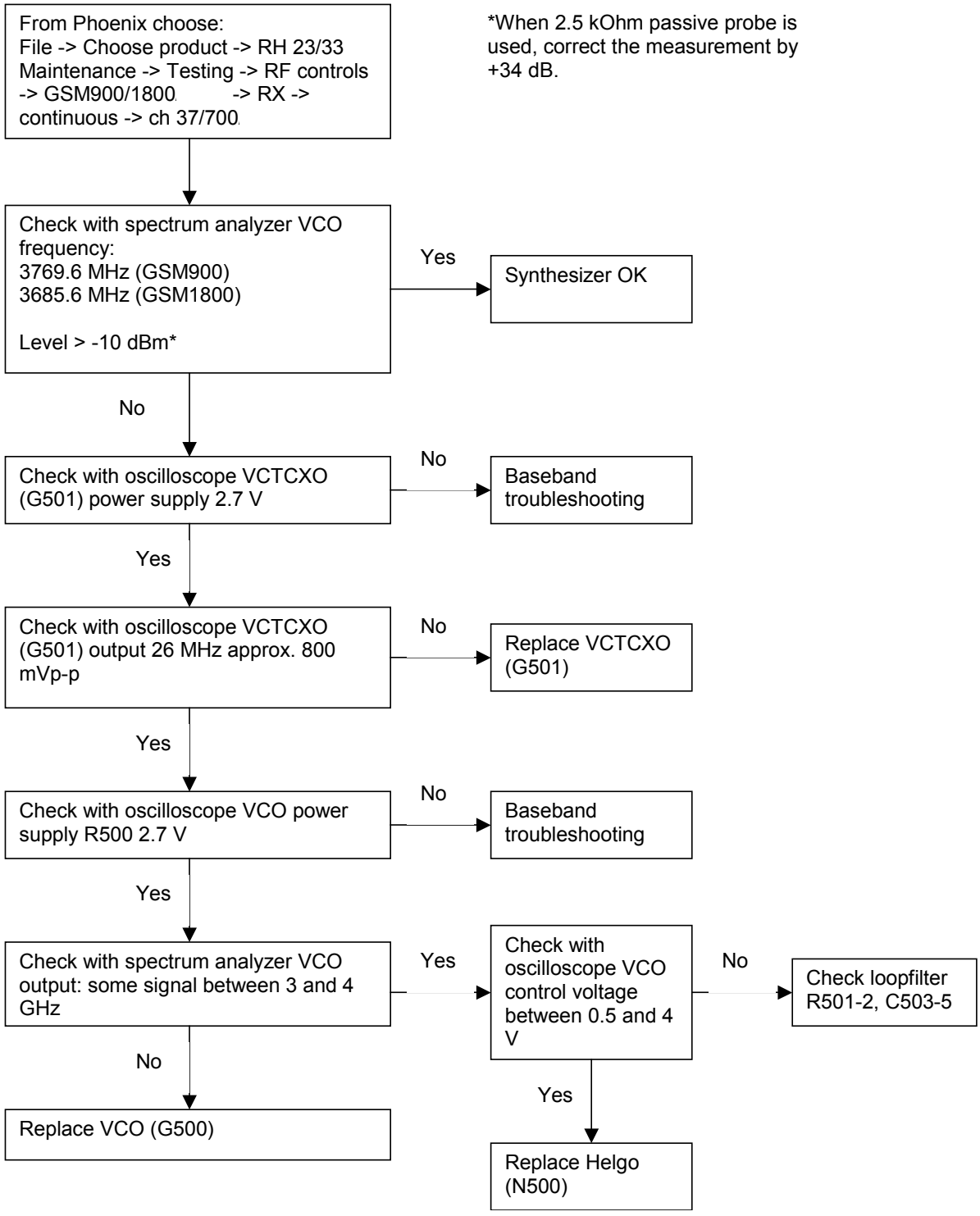
Figure 22: Synthesizer troubleshooting diagram


From Phoenix choose:
File -> Choose product -> RH 23/33
Maintenance -> Testing -> RF controls
-> GSM900/1800 -> RX ->
continuous -> ch 37/700
*When 2.5 kOhm passive probe is used, correct the measurement by +34 dB.
Check with spectrum analyzer VCO frequency:
3769.6 MHz (GSM900)
3685.6 MHz (GSM1800)
Level > -10 dBm*
Yes
Synthesizer OK
No
Check with oscilloscope VCTCXO (G501) power supply 2.7 V
No
Baseband troubleshooting
Yes
Check with oscilloscope VCTCXO (G501) output 26 MHz approx. 800 mVp-p
No
Replace VCTCXO (G501)
Yes
Check with oscilloscope VCO power supply R500 2.7 V
No
Baseband troubleshooting
Yes
Check with spectrum analyzer VCO output: some signal between 3 and 4 GHz
Yes
Check with oscilloscope VCO control voltage between 0.5 and 4 V
No
Check loopfilter R501-2, C503-5
No
Yes
Replace VCO (G500)
Replace Helgo (N500)

Pictures of synthesizer signals

Figure 23: 26MHz at G501 pin out

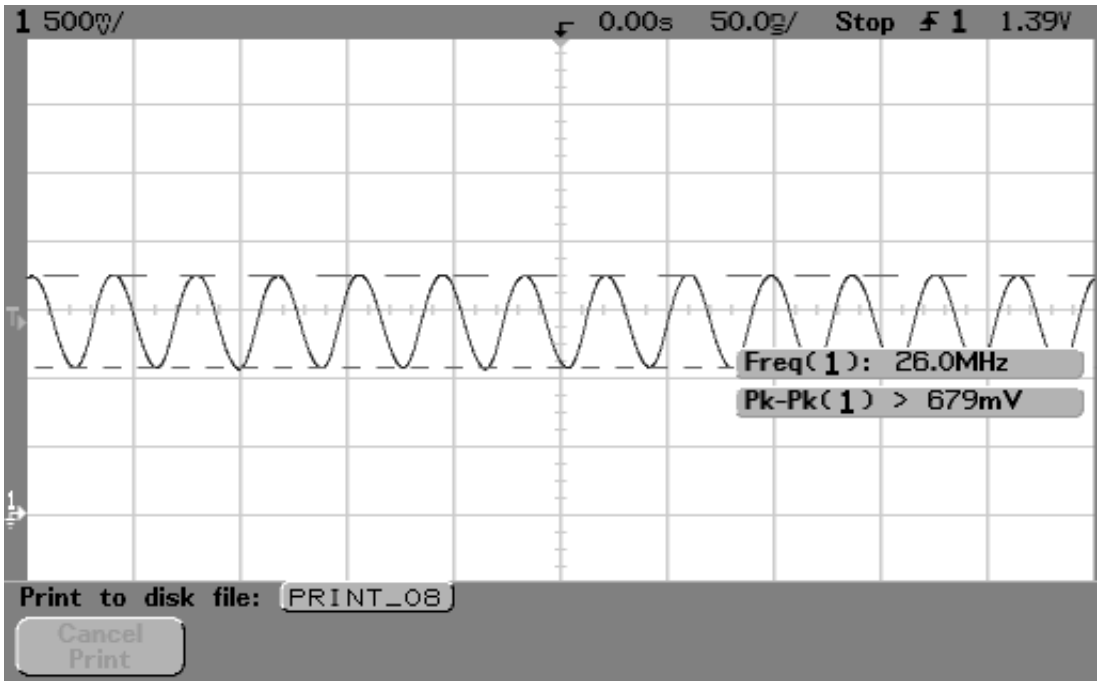


Figure 24: 26MHz RFCLK at R420/C420

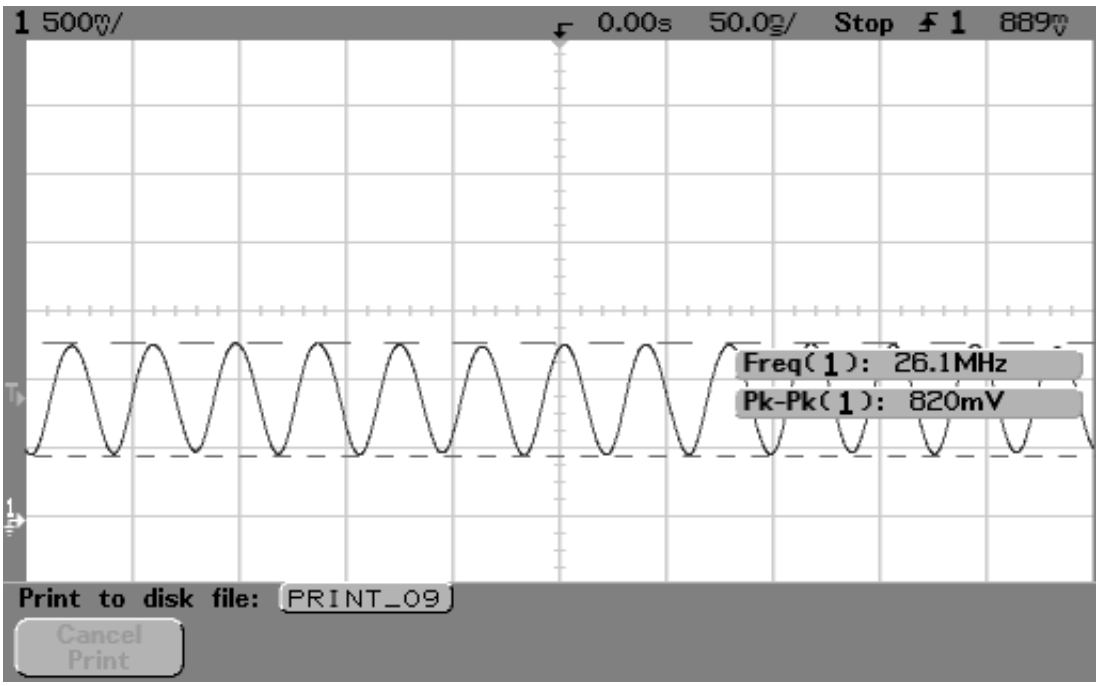


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Figure 25: 1800 TX, channel 512, burst mode

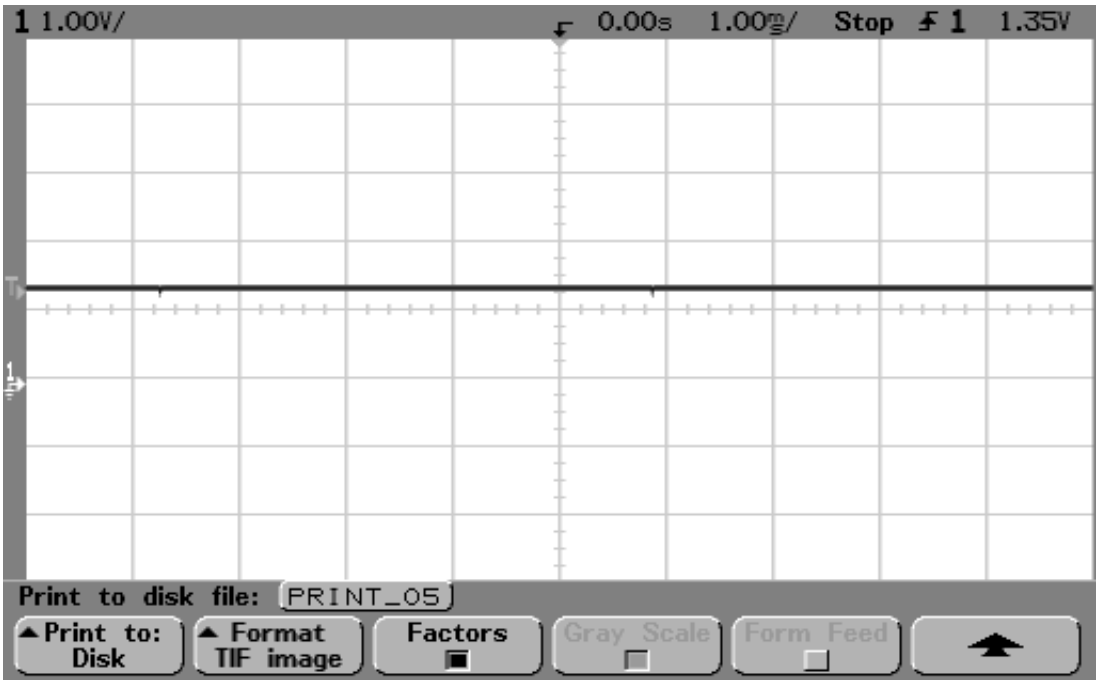
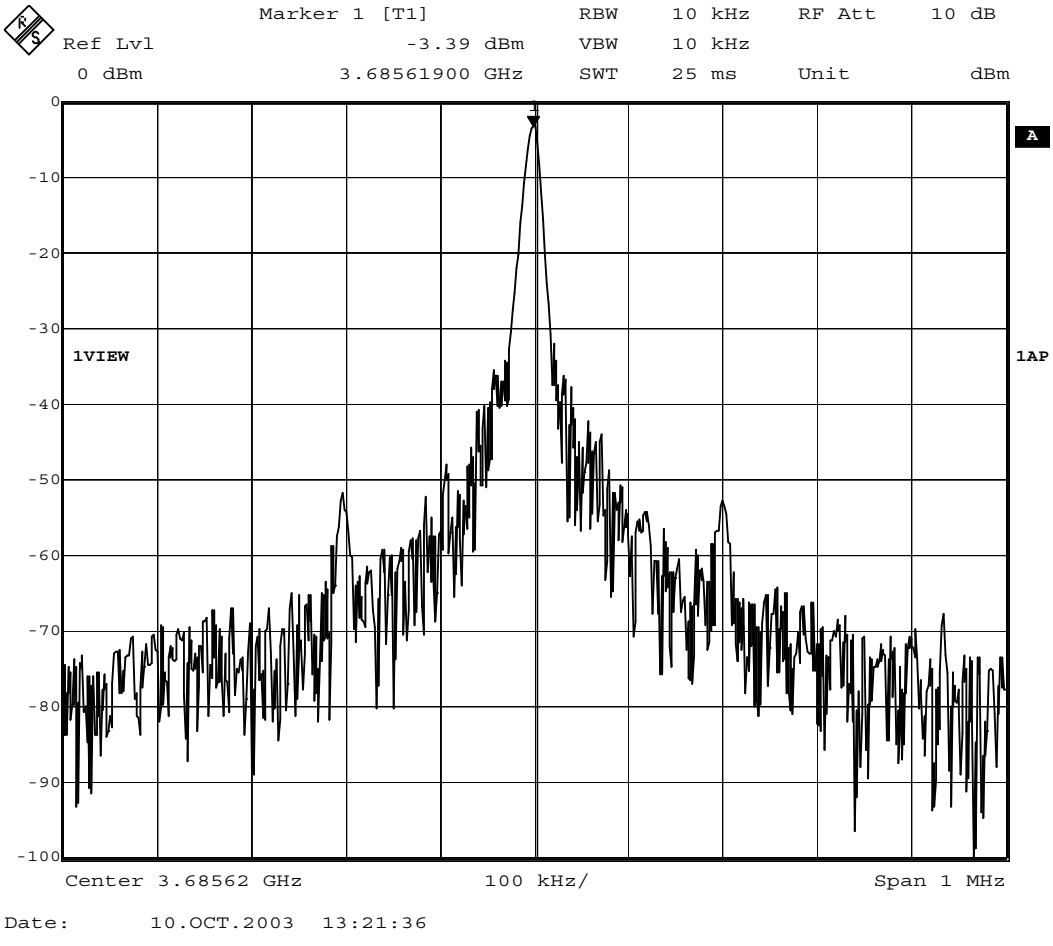


Figure 26: VCO output, 1800 band, ch700, RX on, continuous output



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Baseband troubleshooting

Figure 27: RH-23 Baseband

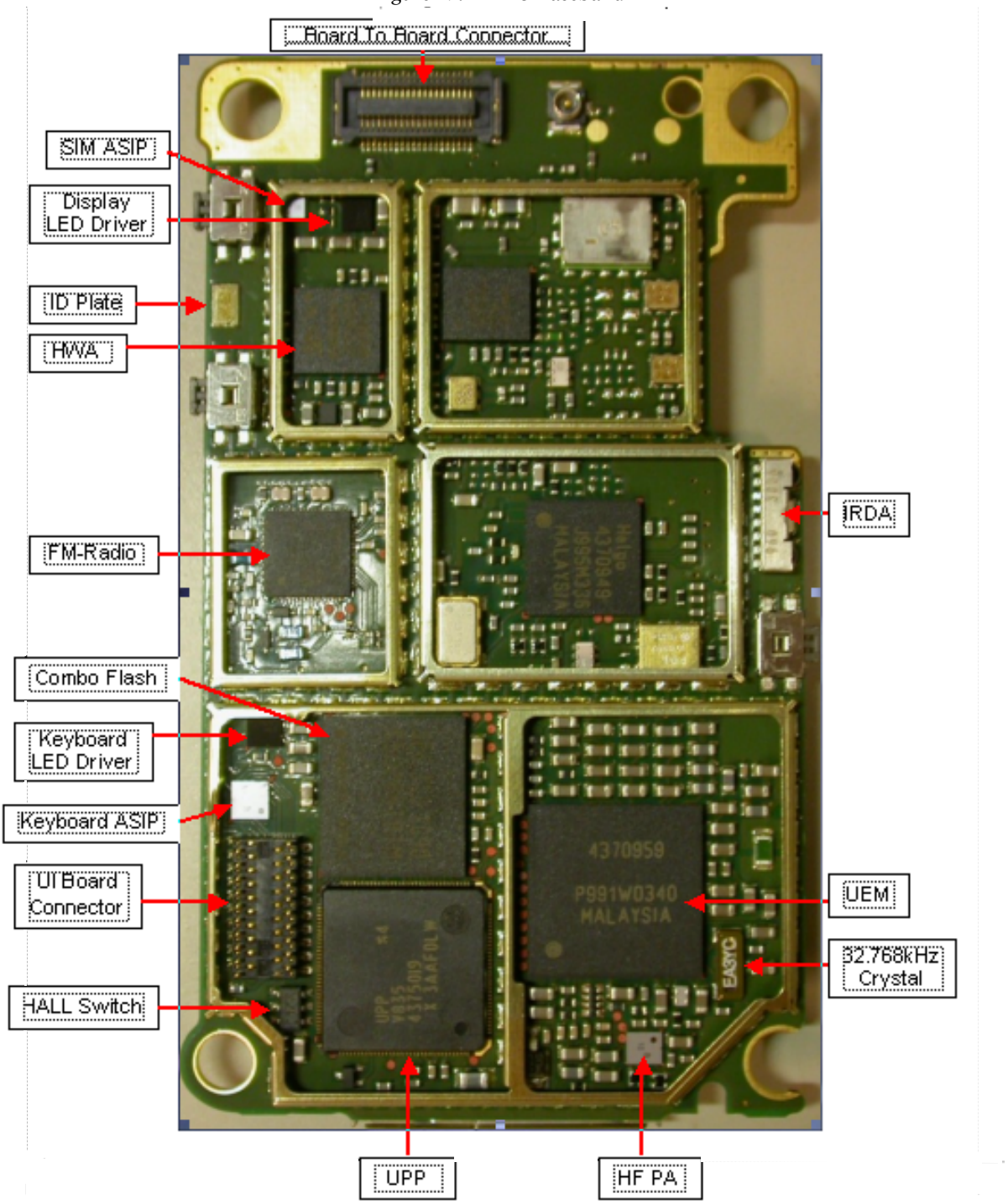

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Figure 28: Testpoints, top

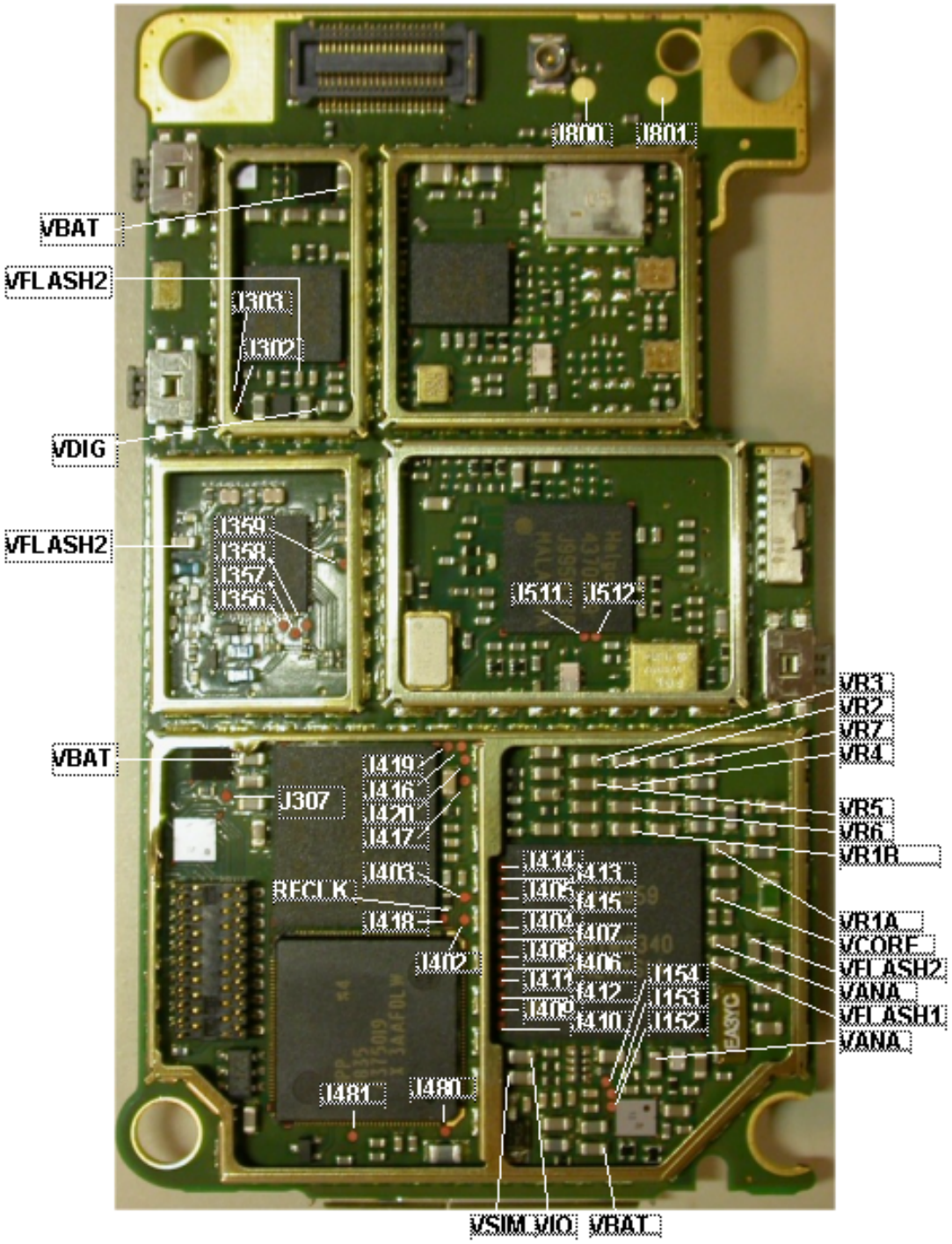

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Figure 29:

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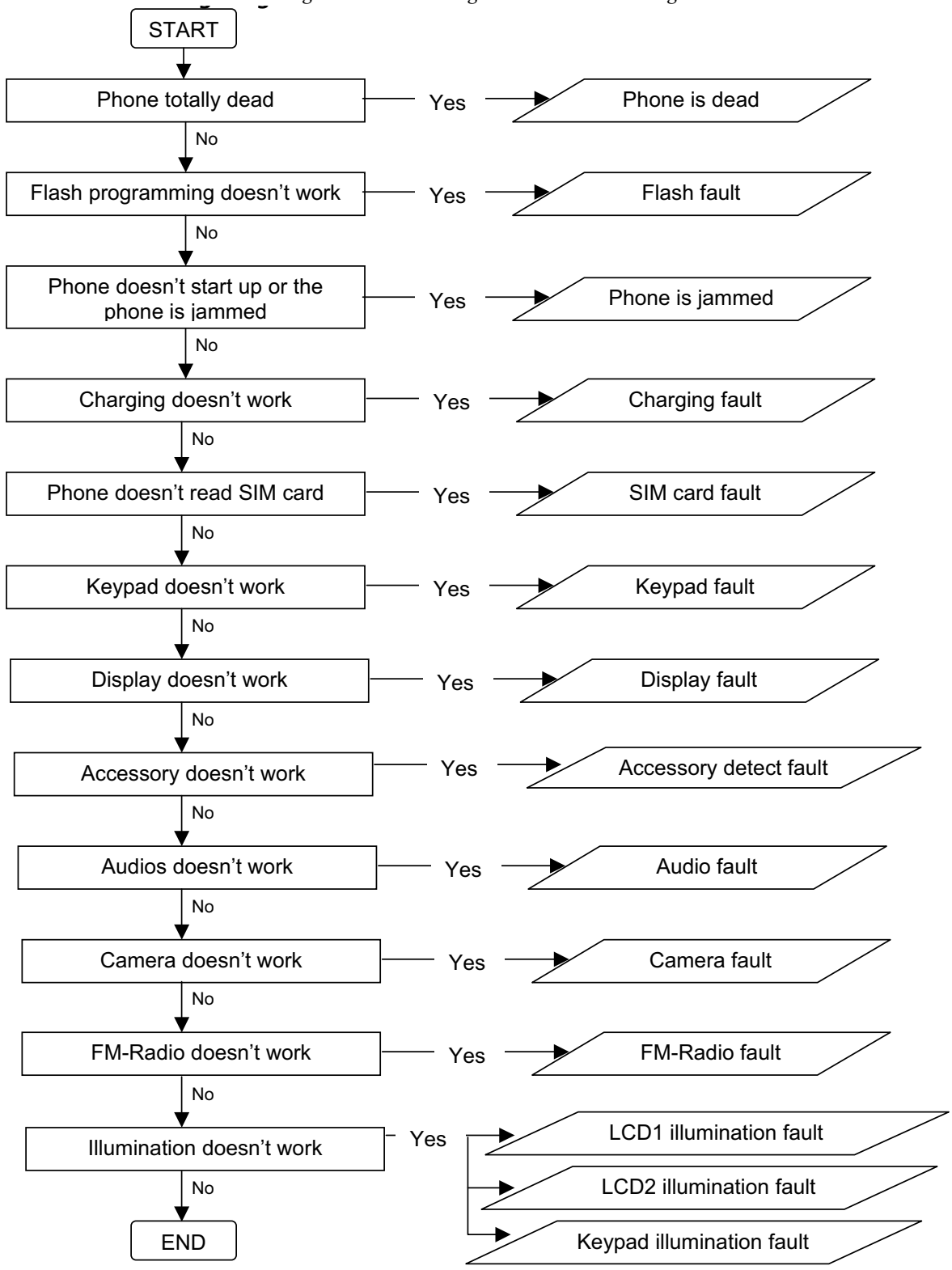
Main Troubleshooting Diagram

Figure 30: Baseband general troubleshooting



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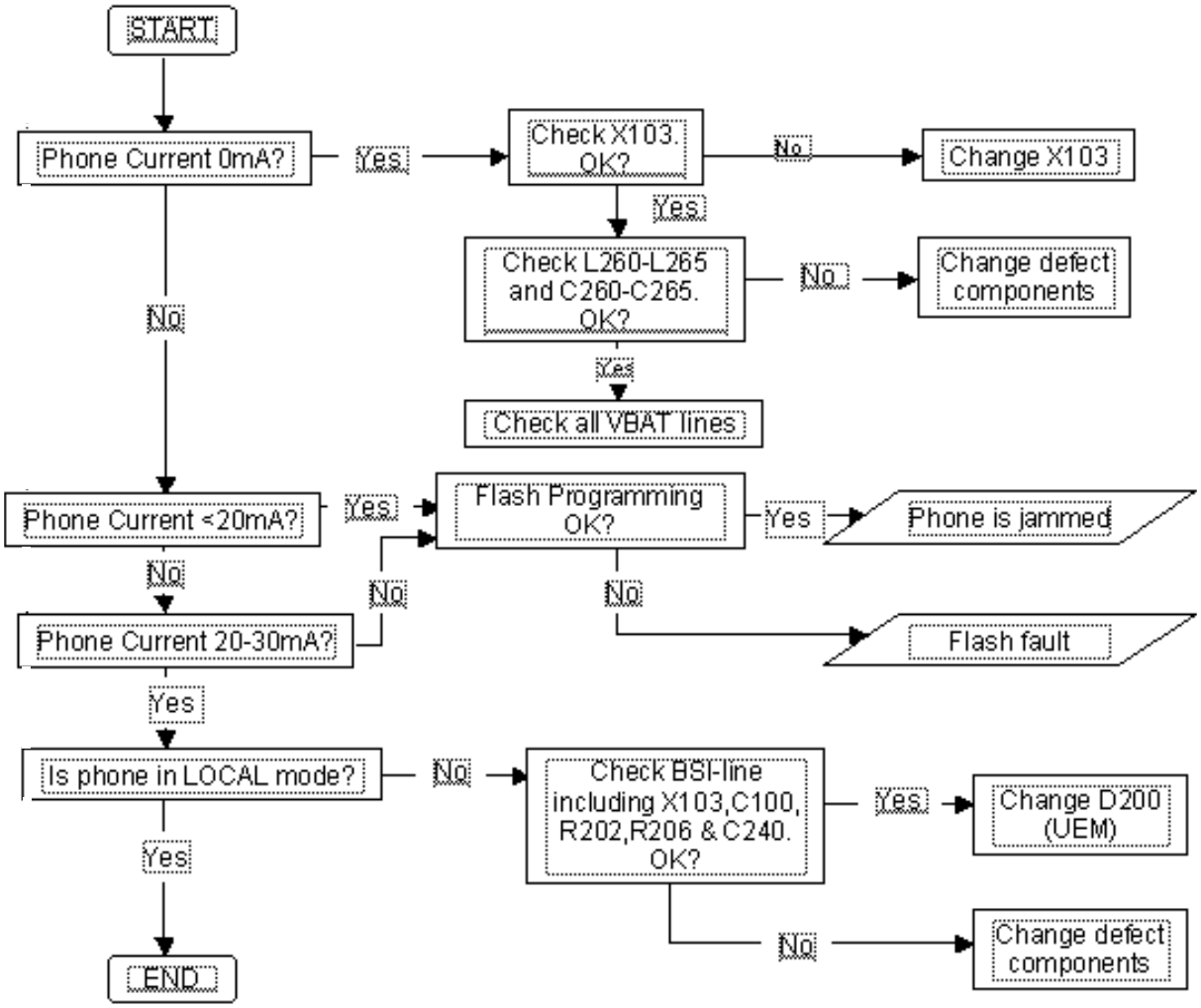
Phone is dead

Figure 31: Dead phone troubleshooting



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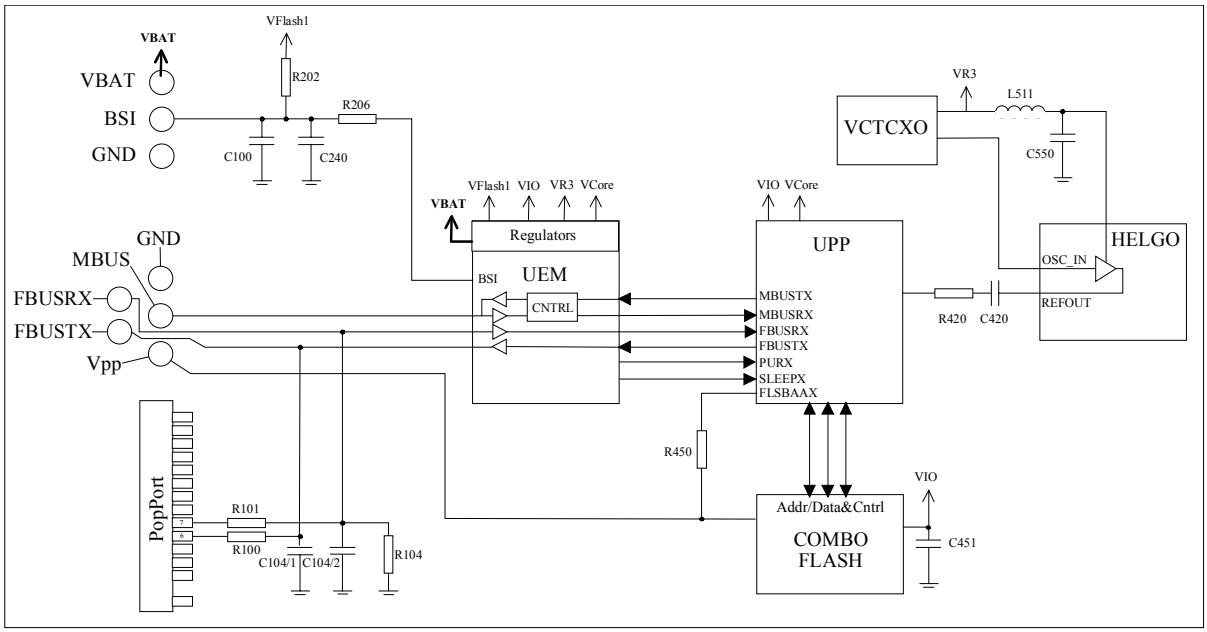
Flash fault

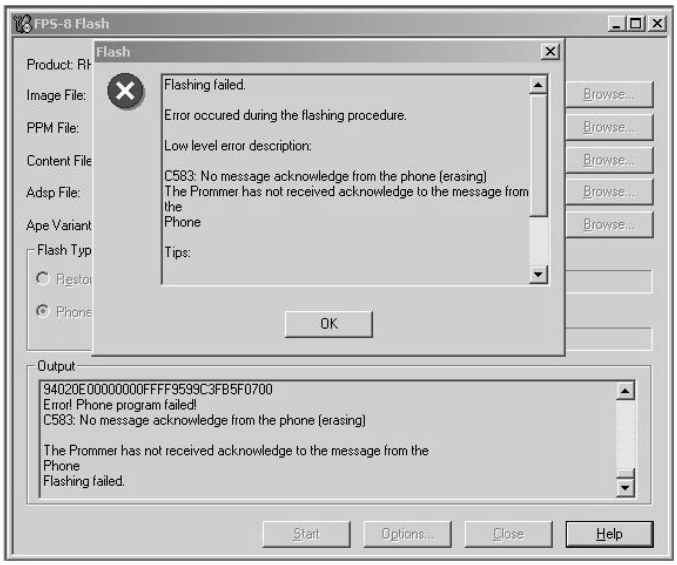
In figure 6 (Flashing signals) you can see simplified diagram of signals and connections needed for flash programming. VBAT, BSI, GND, FBUSRX, FBUSTX, Vpp, MBUS are connected to prommer during flashing. Flash programming is a sequence of tasks and handshakes which are all needed to pass in order to succesfully flash the phone.

Figure 32: Flashing signals



Use the flashing instructions and flash the phone using "FPS-8 Flash" in Phoenix. When flashing fails an error message is displayed. The message contains HEX coded error and a short description of error. Picture of error message in figure 7.

Figure 33:



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Flash fault

In Table 1 you can see the signals/components related to each flashing error.

When the text is **bolded** the item is being used first time during the flashing procedure.

Table 1: Most common error messages

Error	Description	Used signals/components	Points to check
C101	The Phone does not set FlashbusTXD line high after the startup.	**Vbat, Vcore, VIO, VFLASH1** **BSI and FBUSRX from prommer to UEM** **FBUSTX from UPP->UEM-> Prommer (Stuck at '0')** **SLEEPX from UEM to UPP**	VBAT from C167 VCore from C208 VIO from C451 VFLASH from R202 BSI pulse at R206 and when flashing starts, FBUSRX at R101 FBUSTX state at J411(UPP)->R100(UEM) SLEEPX at J403
C102	The Phone does not set Flashbus TXD line low after the line has been high. The Prommer generates this error also when the Phone is not connected to the Prommer.	**PURX, VR3** **RFCLOCK (VCTCXO->Helgo-> UPP)** **MBUS from Prommer->UEM ->UPP(stuck at '1')** **FBUSTX from UPP->UEM-> Prommer (Stuck at '1')**	PURX state transition '0' to '1' at J402 VR3 at C227 and L511 RFCLOCK at G501 and R420 MBUS pulse train at J410 FBUSTX state at J411(UPP)->R100(UEM)
C103	The Phone MCU has not received the first dummy word correctly from the Prommer after the startup.	**MBUS from Prommer->UEM-> UPP(Stuck at '0')** FBUSRX from Prommer->UEM-> UPP FBUSTX from UPP->UEM->Prommer	MBUS pulse train from J410 FBUSRX serial data from J412 FBUSTX state from J411(UPP)->R100(UEM)
C107	"The Phone MCU can not start Secondary code correctly."	**UPP**	
A204	The flash manufacturer and device IDs in the existing Algorithm files do not match with the IDs received from the target phone.	**Combo Flash** **Signals between UPP and Combo Flash**	Prommer SW
A387	The MCU ID in the FIASCO_MCU_ID_INFO block of the MCUSW file does not match with the ID received from the target phone.	UPP	Prommer SW
C583 C683	The Prommer has not received Phone acknowledge to the message.	Combo Flash and UPP Signals between UPP and Combo Flash	

Error	Description	Used signals/components	Points to check
C584 C684	The Phone has generated NAK signal during data block transfer.	Combo Flash and UPP Signals between UPP and Combo Flash	
C585 C685	The Phone has not acknowledged data block correctly.	Combo Flash and UPP Signals between UPP and Combo Flash	
C586 C686	The erasing status response from the Phone informs about fail.	Combo Flash	

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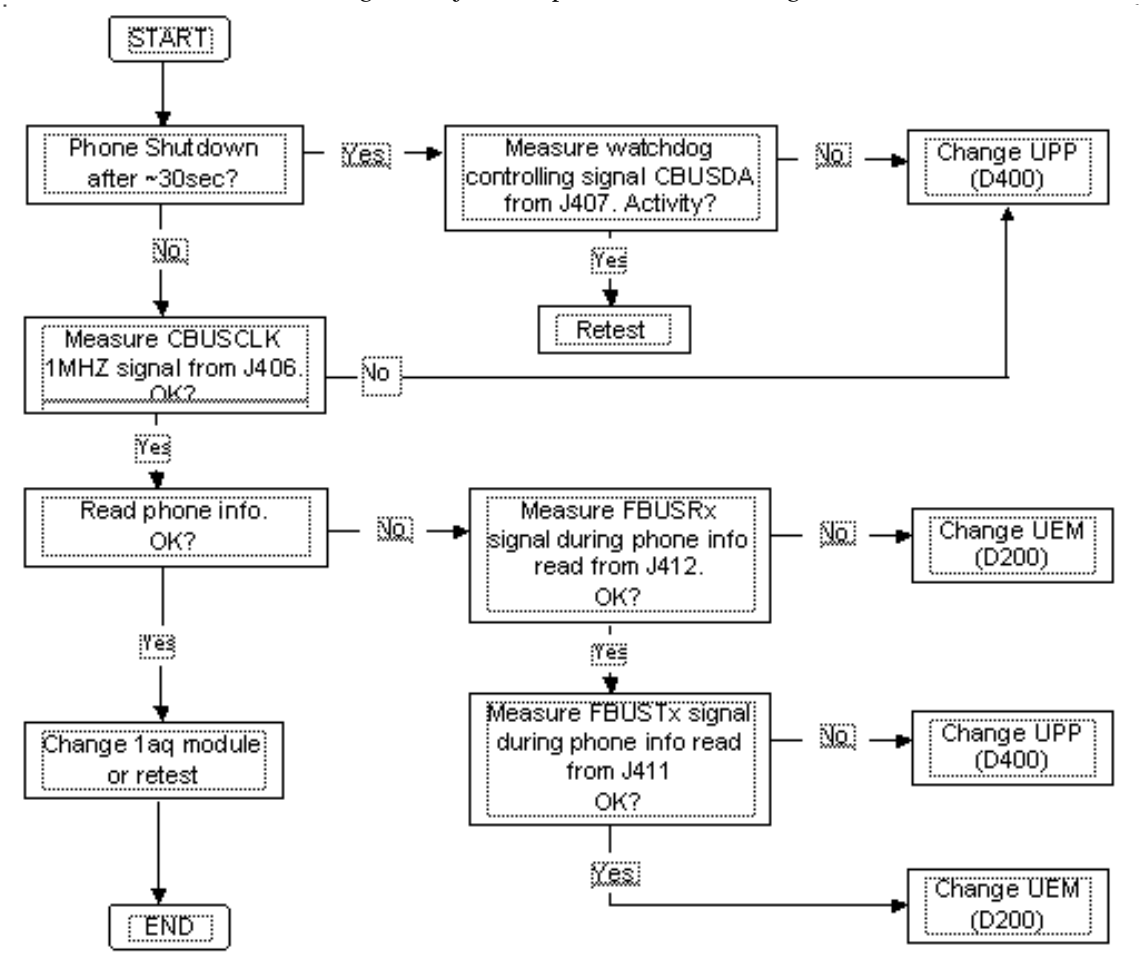
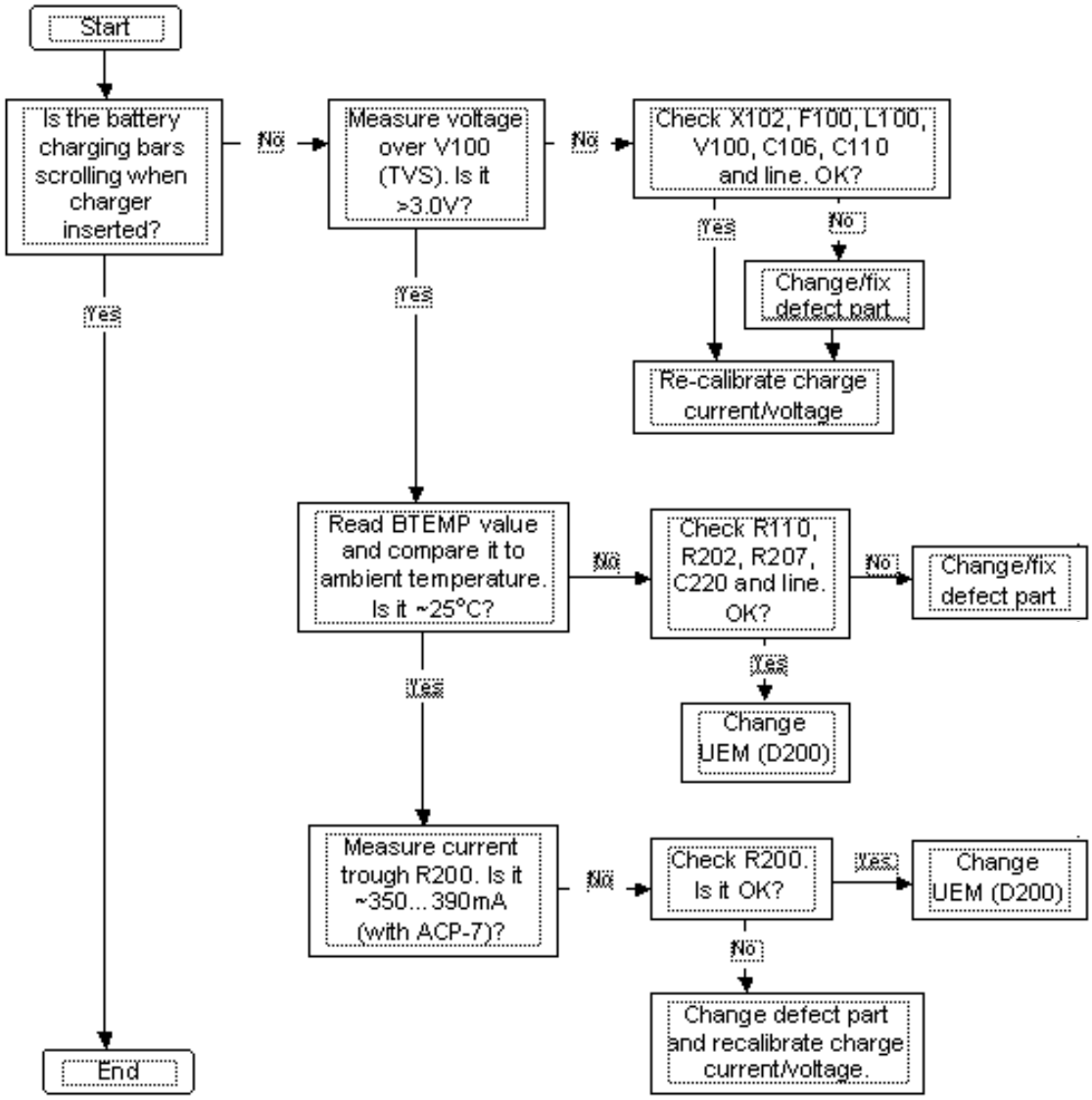
Phone is jammed

Figure 34: Jammed phone troubleshooting



Charging fault

Figure 35: Charging failure troubleshooting



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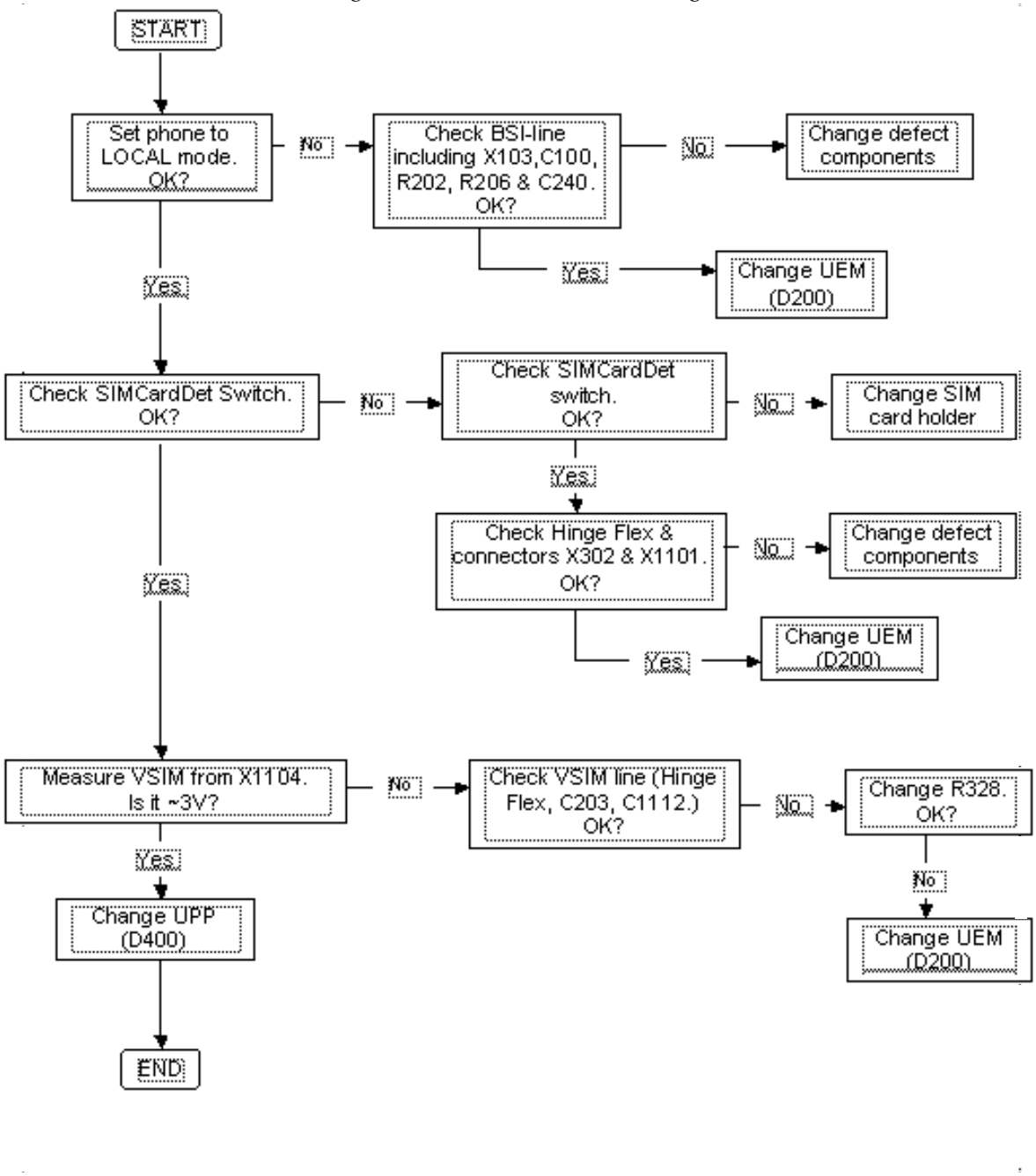
SIM card fault ("Insert SIM card" or "SIM card rejected")

Figure 36: SIM failure troubleshooting



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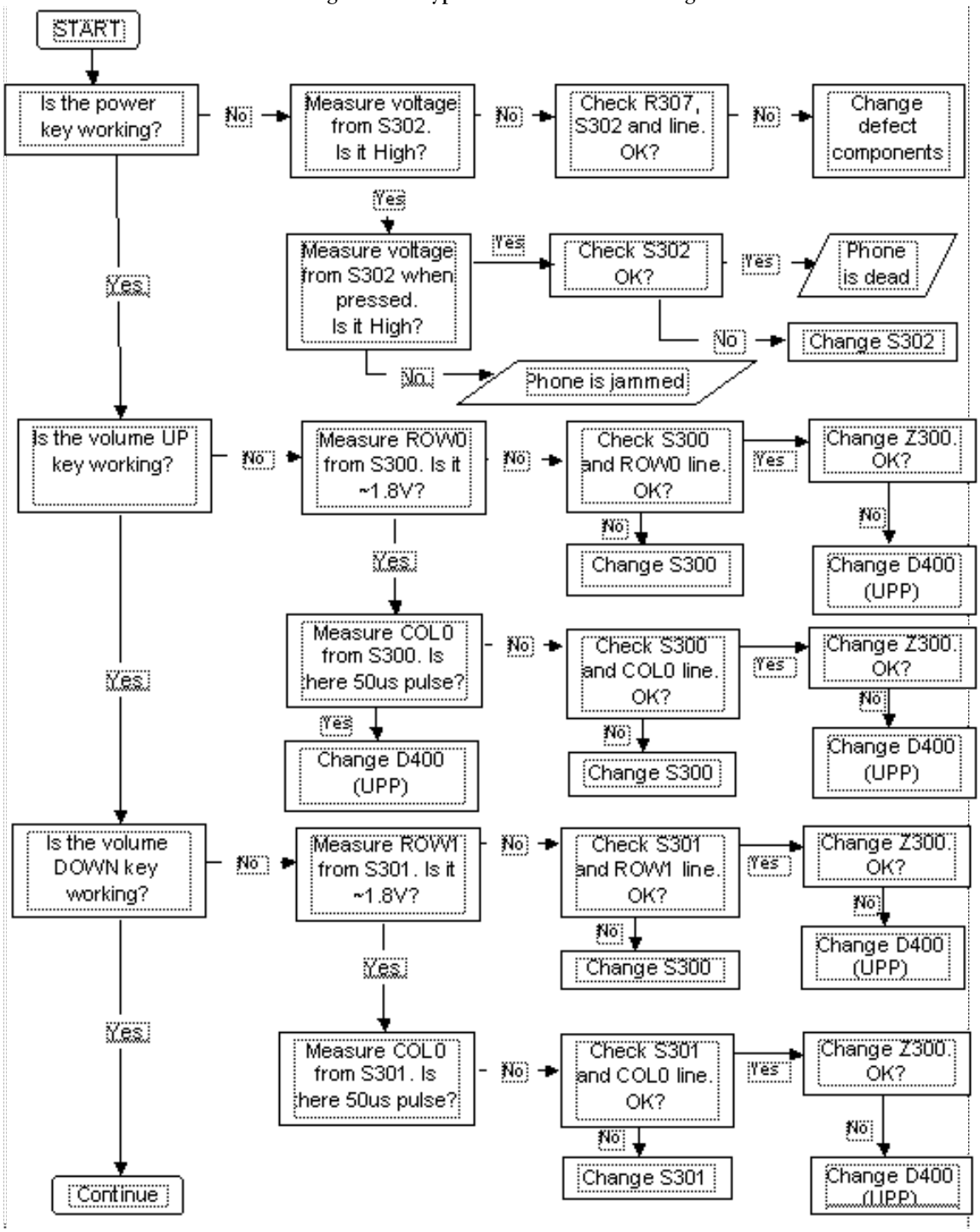
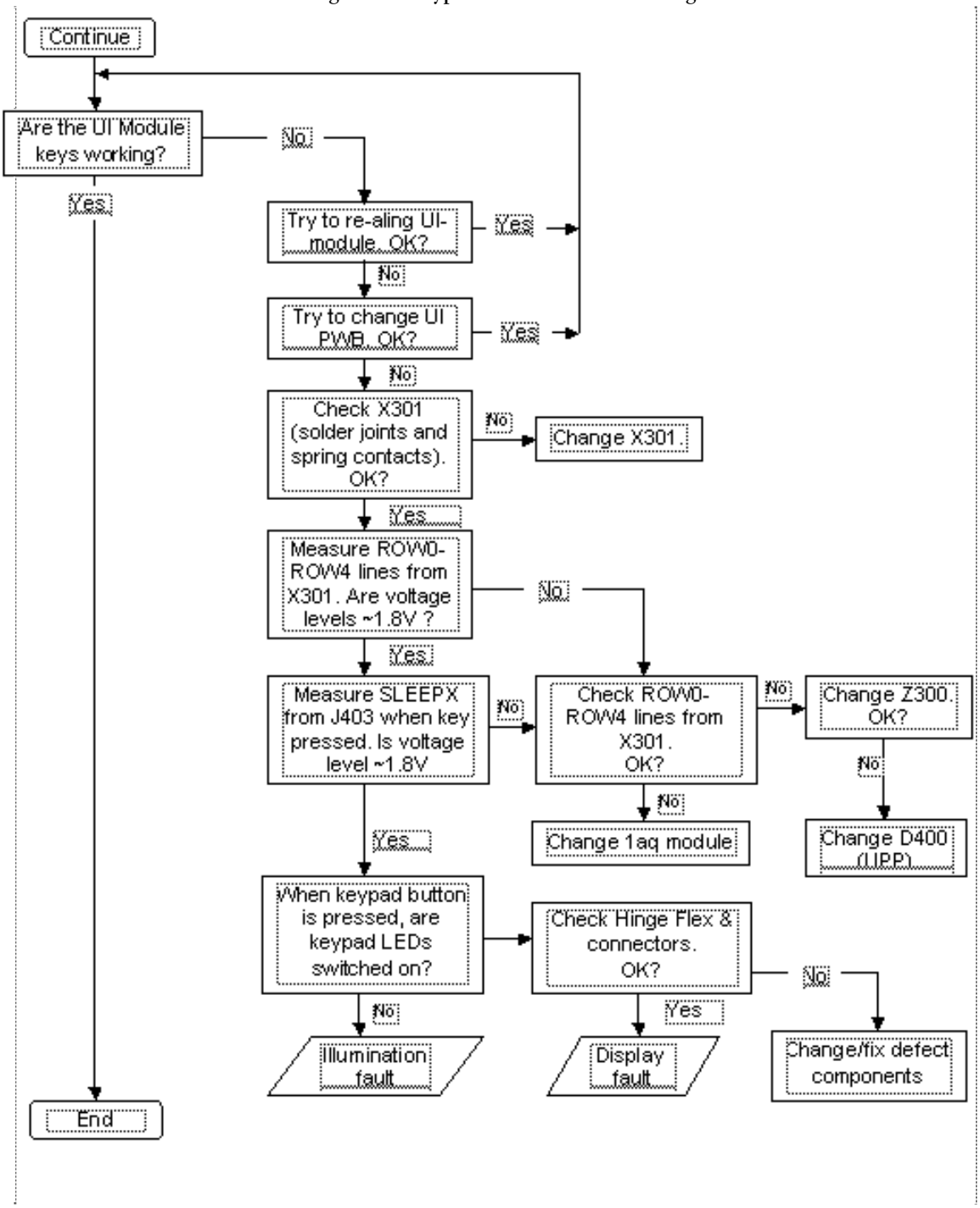
Keypad fault

Figure 37: Keypad failure troubleshooting



Keypad fault (continued)

Figure 38: Keypad failure troubleshooting



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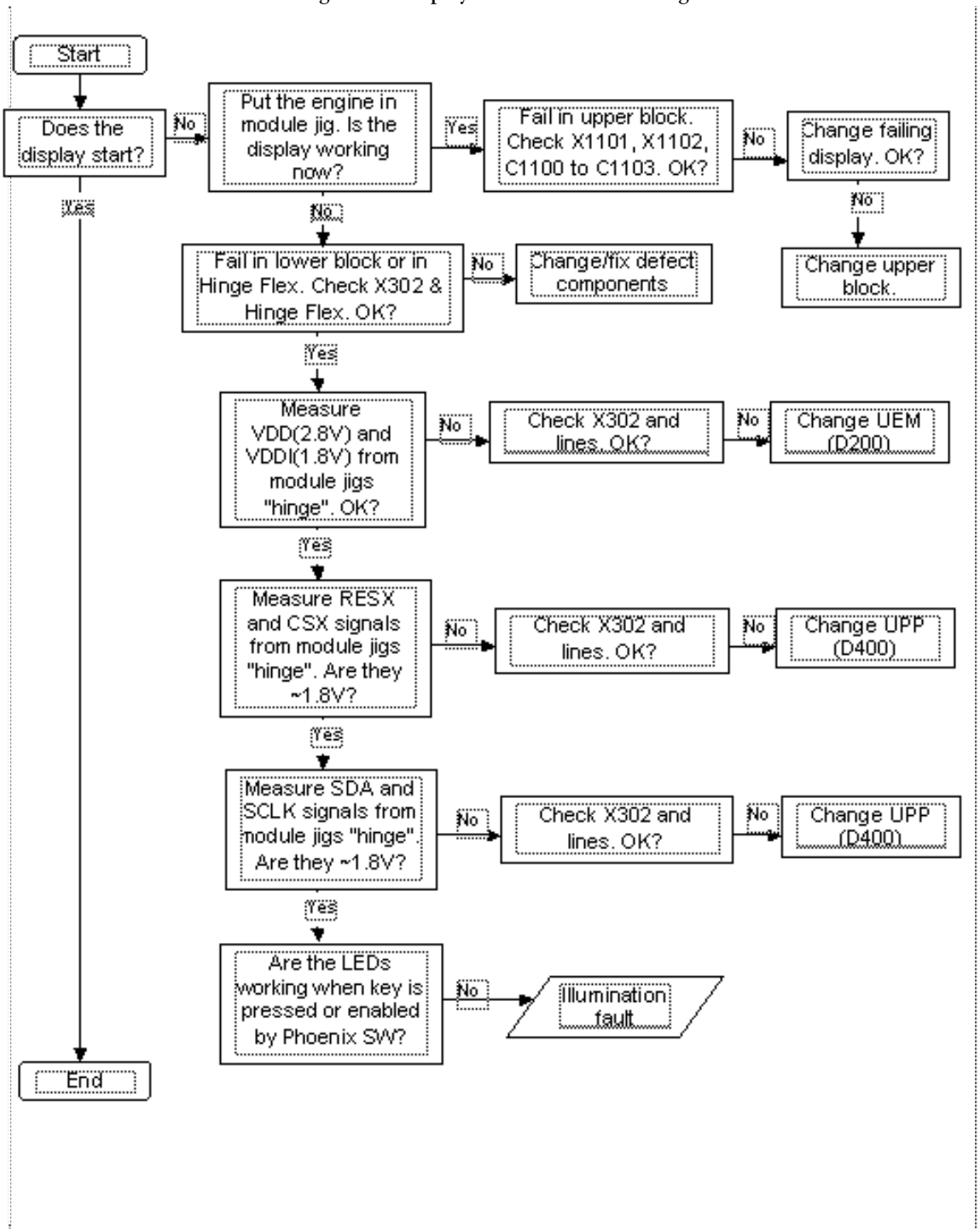
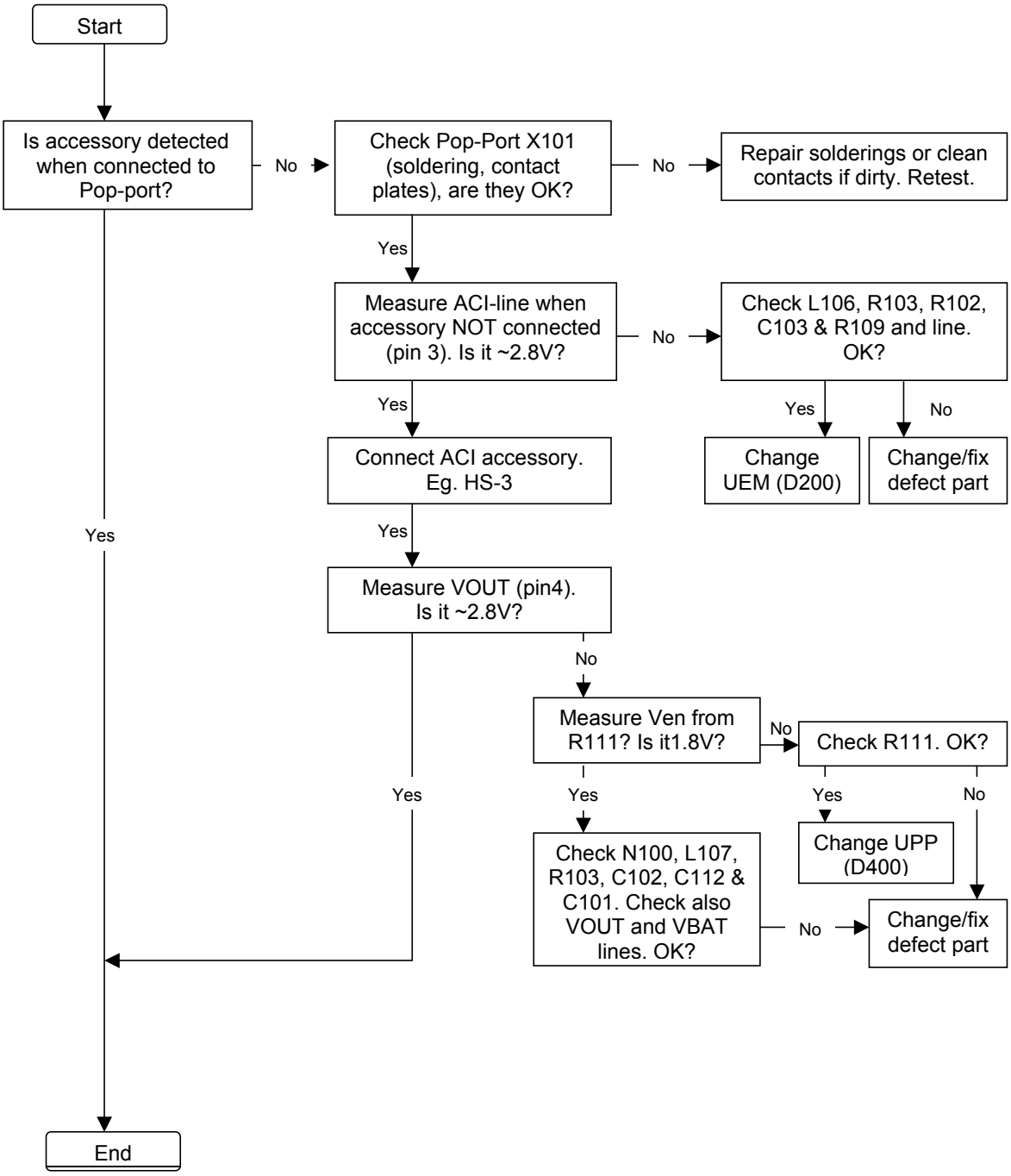
Display fault

Figure 39: Display failure troubleshooting



Accessory detection fault

Figure 40: Accessory detection failure troubleshooting



Audio faults

Figure 41: Audio (earpiece) failure teoublehooting

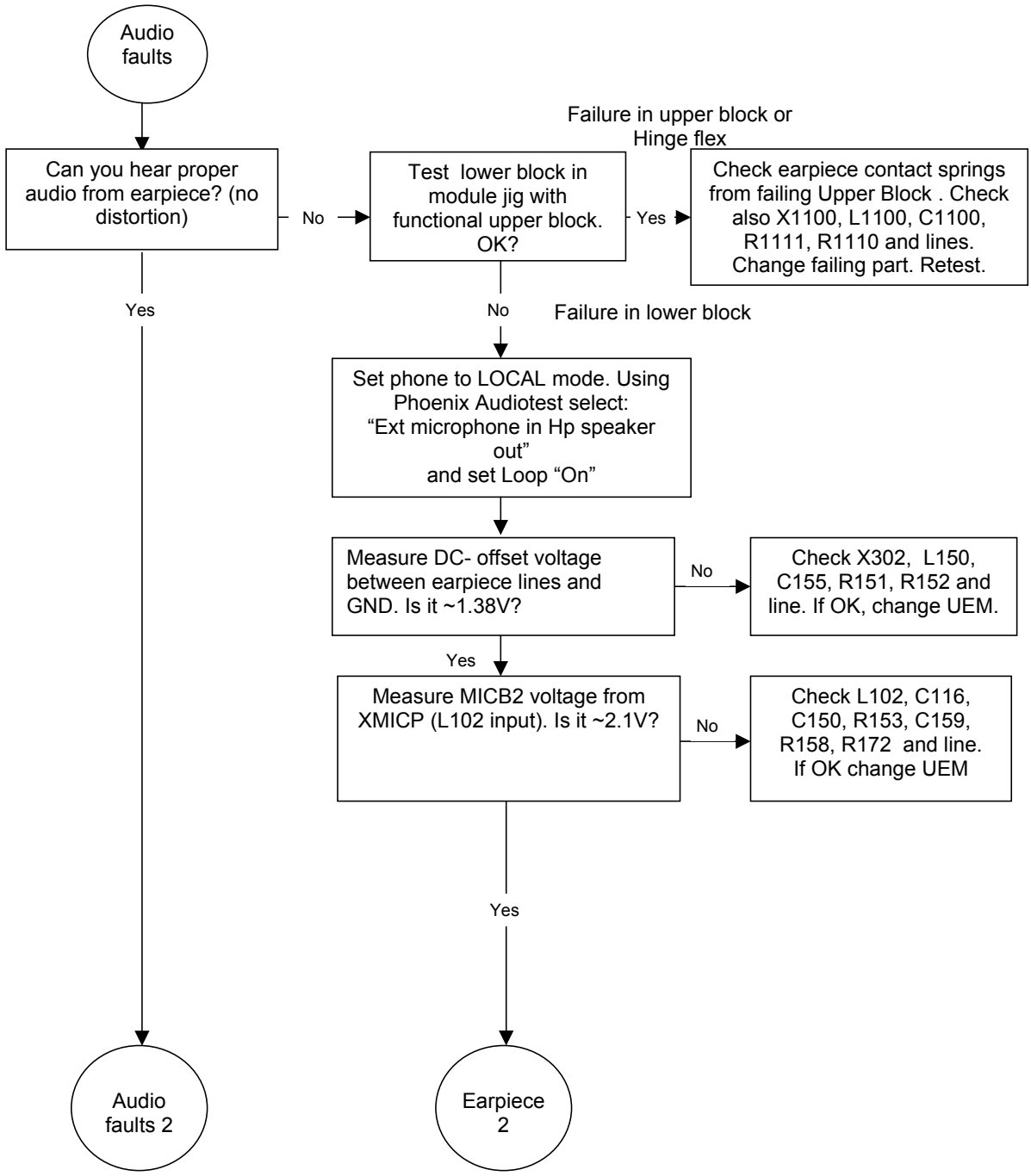

Audio faults
Can you hear proper audio from earpiece? (no distortion)
No
Test lower block in module jig with functional upper block. OK?
Yes
Failure in upper block or Hinge flex
Check earpiece contact springs from failing Upper Block . Check also X1100, L1100, C1100, R1111, R1110 and lines. Change failing part. Retest.
Yes
No
Failure in lower block
Set phone to LOCAL mode. Using Phoenix Audiotest select: "Ext microphone in Hp speaker out" and set Loop "On"
Measure DC- offset voltage between earpiece lines and GND. Is it ~1.38V?
No
Check X302, L150, C155, R151, R152 and line. If OK, change UEM.
Yes
Measure MICB2 voltage from XMICP (L102 input). Is it ~2.1V?
No
Check L102, C116, C150, R153, C159, R158, R172 and line. If OK change UEM
Yes
Audio faults 2
Earpiece 2

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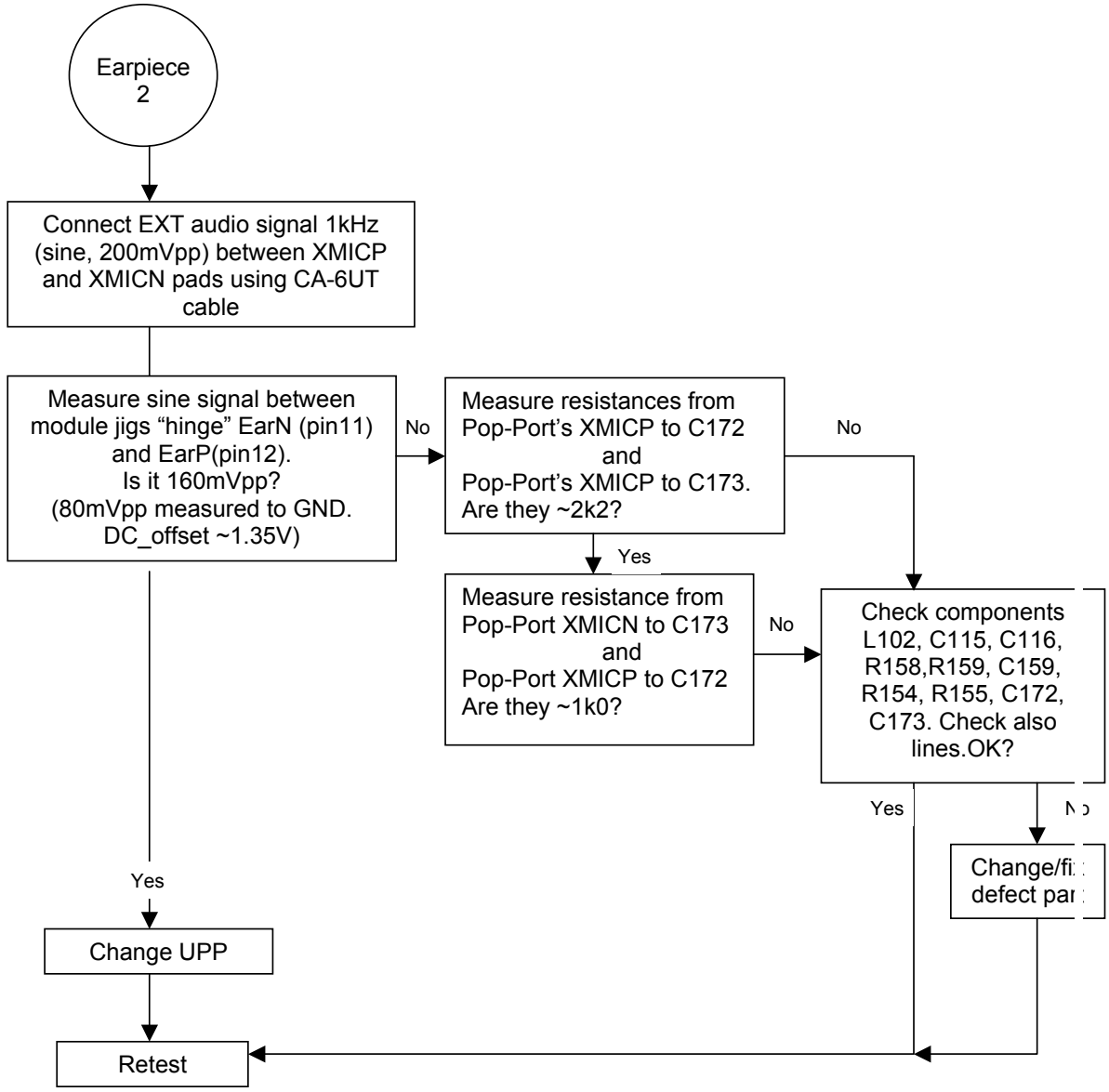
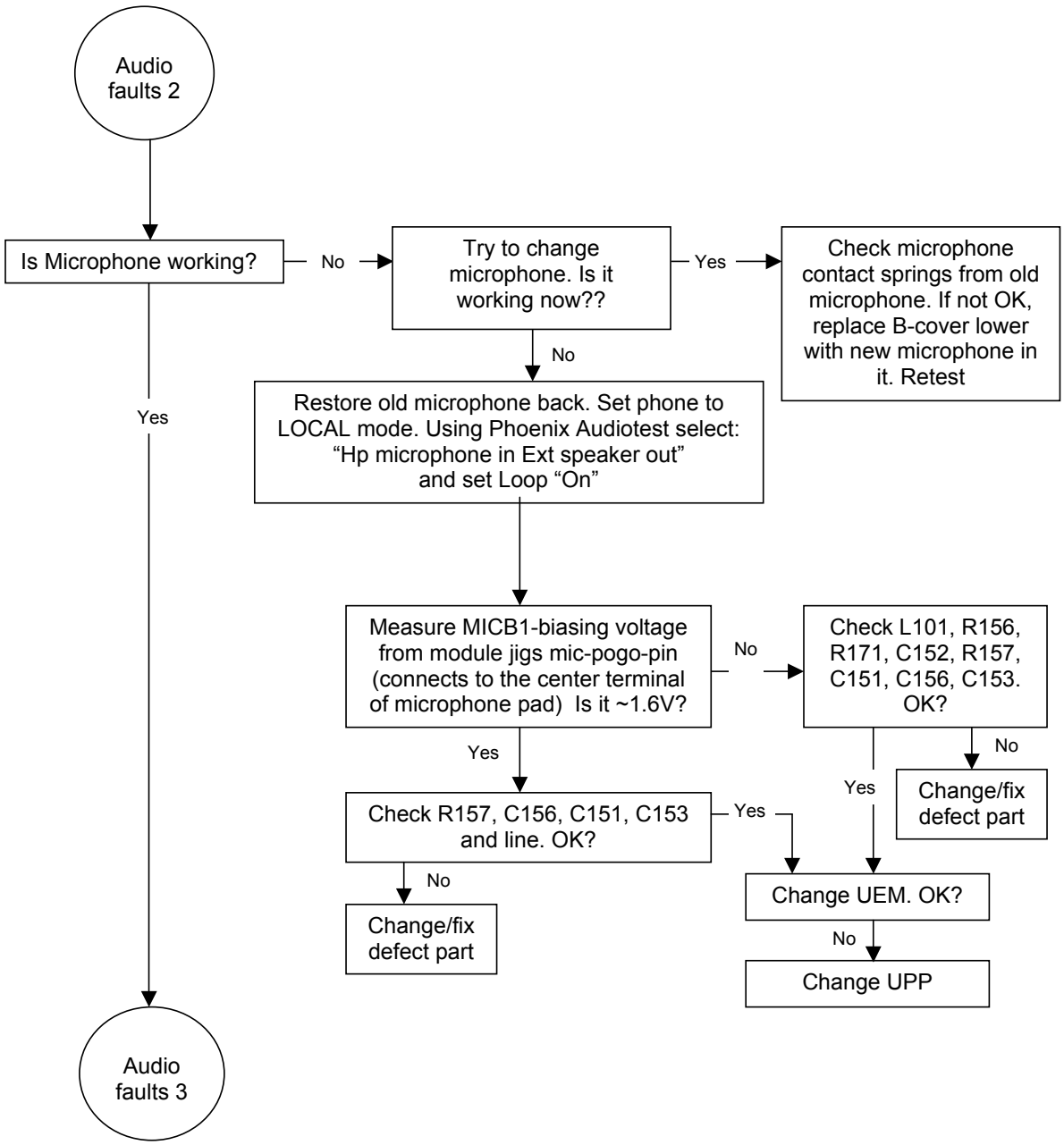
Figure 42: Audio (earpiece 2) failure troubleshooting


Earpiece 2
Connect EXT audio signal 1kHz (sine, 200mVpp) between XMICP and XMICN pads using CA-6UT cable
Measure sine signal between module jigs “hinge” EarN (pin11) and EarP(pin12). Is it 160mVpp? (80mVpp measured to GND. DC_offset ~1.35V)
No
Measure resistances from Pop-Port’s XMICP to C172 and Pop-Port’s XMICP to C173. Are they ~2k2?
No
Yes
Measure resistance from Pop-Port XMICN to C173 and Pop-Port XMICP to C172 Are they ~1k0?
No
Check components L102, C115, C116, R158,R159, C159, R154, R155, C172, C173. Check also lines.OK?
Yes
Change/fi
defect par
Yes
Change UPP
Retest

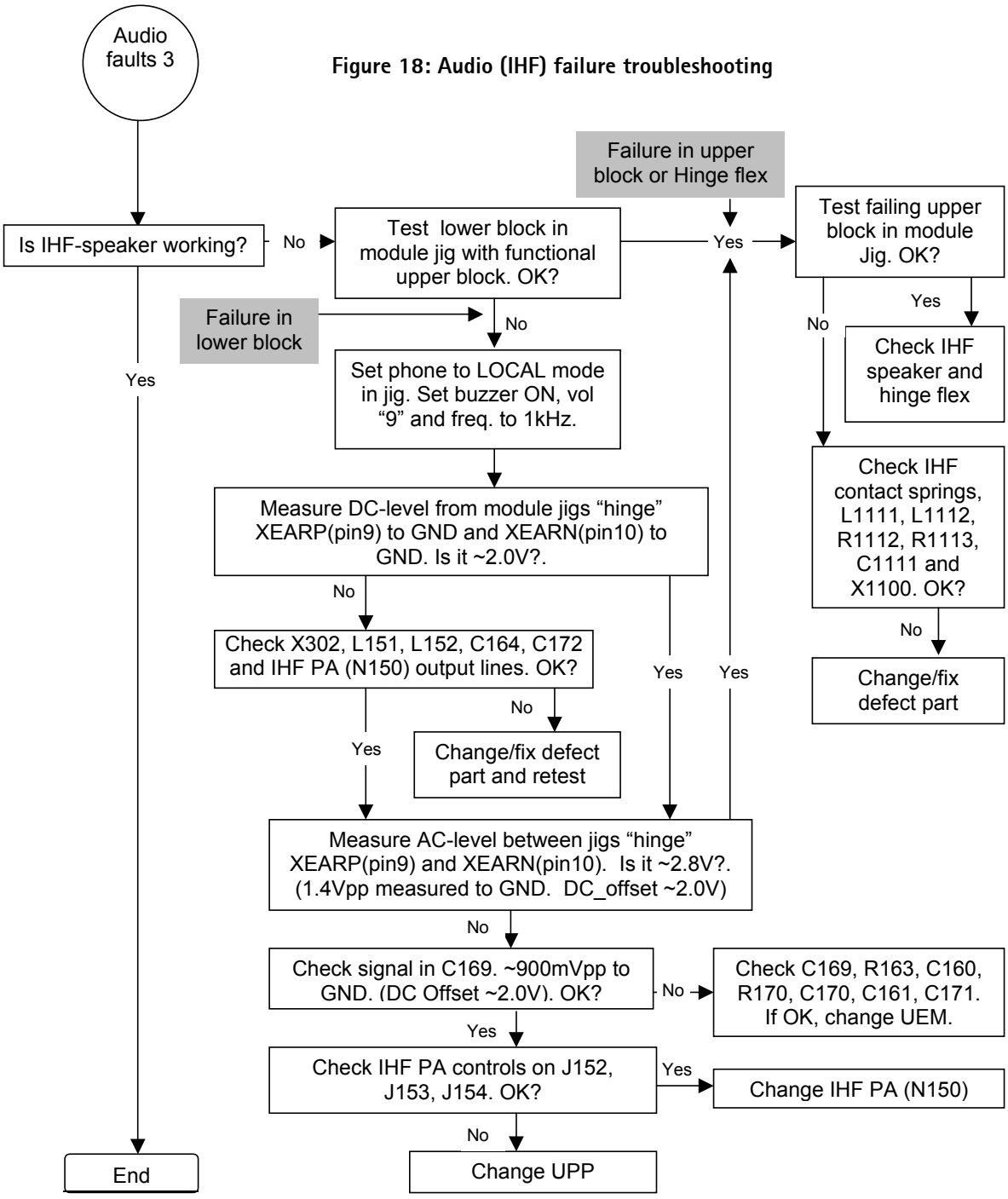
Audio fault (microphone)

Figure 43: Audio (microphone) failure troubleshooting


Audio faults 2
Is Microphone working?
No
Try to change microphone. Is it working now??
Yes
Check microphone contact springs from old microphone. If not OK, replace B-cover lower with new microphone in it. Retest
No
Yes
Restore old microphone back. Set phone to LOCAL mode. Using Phoenix Audiotest select: "Hp microphone in Ext speaker out" and set Loop "On"
Measure MICB1-biasing voltage from module jigs mic-pogo-pin (connects to the center terminal of microphone pad) Is it ~1.6V?
No
Check L101, R156, R171, C152, R157, C151, C156, C153. OK?
No
Yes
Change/fix defect part
Yes
Check R157, C156, C151, C153 and line. OK?
Yes
No
Change/fix defect part
Change UEM. OK?
No
Change UPP
Audio faults 3

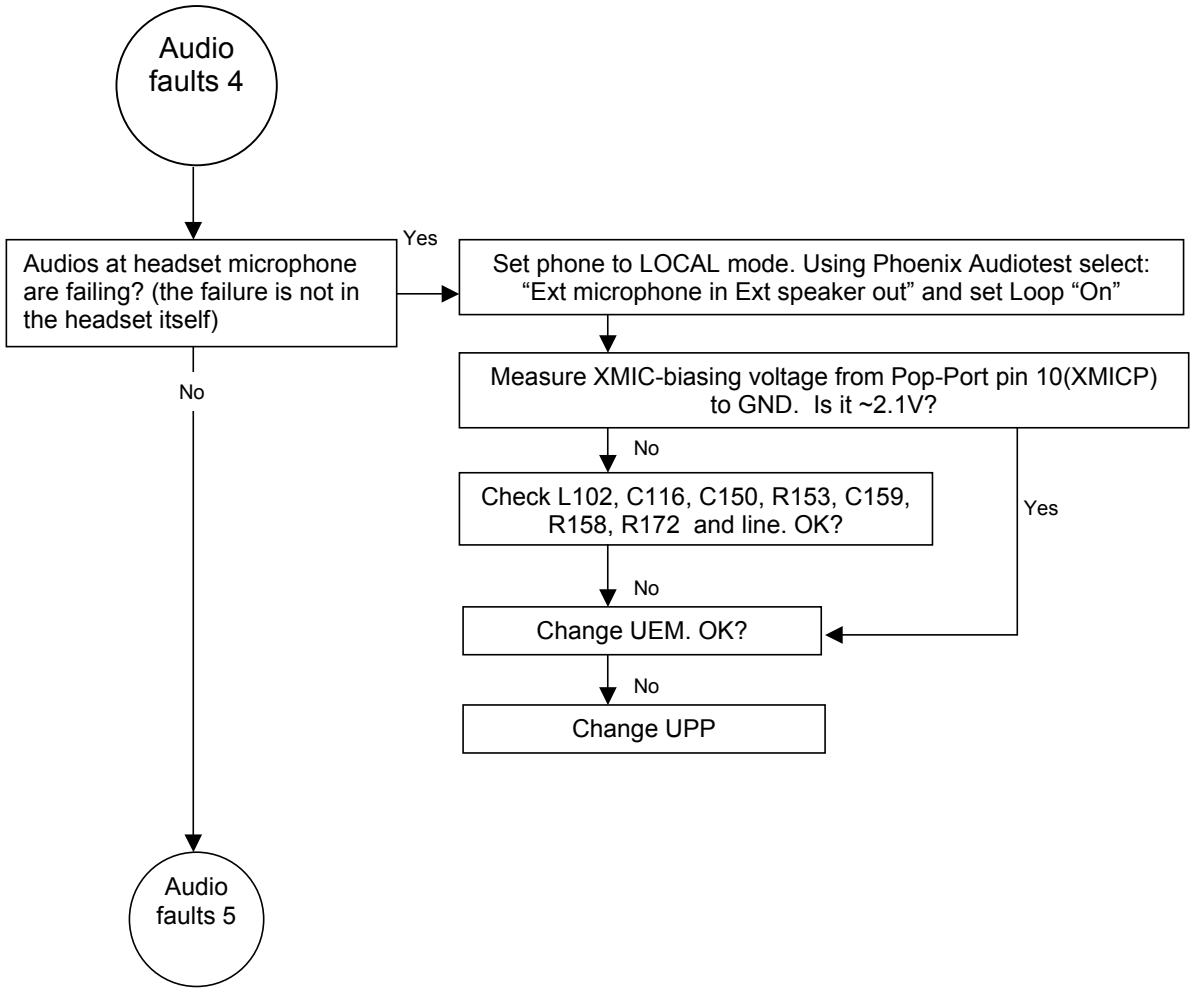
Audio fault (IHF)

Figure 44: Audio (IHF) troubleshooting


Audio faults 3
Figure 18: Audio (IHF) failure troubleshooting
Failure in upper block or Hinge flex
Is IHF-speaker working?
No
Test lower block in module jig with functional upper block. OK?
Yes
Test failing upper block in module Jig. OK?
Yes
No
Check IHF speaker and hinge flex
Failure in lower block
No
Set phone to LOCAL mode in jig. Set buzzer ON, vol "9" and freq. to 1kHz.
Yes
Check IHF contact springs, L1111, L1112, R1112, R1113, C1111 and X1100. OK?
No
Change/fix defect part
Measure DC-level from module jigs "hinge" XEARP(pin9) to GND and XEARN(pin10) to GND. Is it ~2.0V?.
No
Check X302, L151, L152, C164, C172 and IHF PA (N150) output lines. OK?
Yes
Yes
No
Yes
Change/fix defect part and retest
Measure AC-level between jigs "hinge" XEARP(pin9) and XEARN(pin10). Is it ~2.8V?. (1.4Vpp measured to GND. DC_offset ~2.0V)
No
Check signal in C169. ~900mVpp to GND. (DC Offset ~2.0V). OK?
No
Check C169, R163, C160, R170, C170, C161, C171. If OK, change UEM.
Yes
Check IHF PA controls on J152, J153, J154. OK?
Yes
Change IHF PA (N150)
No
End
Change UPP

Audio fault (headset microphone)

Figure 45: Audio (headset microphone) failure troubleshooting


Audio faults 4
Audios at headset microphone are failing? (the failure is not in the headset itself)
Yes
No
Set phone to LOCAL mode. Using Phoenix Audiotest select: "Ext microphone in Ext speaker out" and set Loop "On"
Measure XMIC-biasing voltage from Pop-Port pin 10(XMICP) to GND. Is it ~2.1V?
No
Yes
Check L102, C116, C150, R153, C159, R158, R172 and line. OK?
No
Change UEM. OK?
No
Change UPP
Audio faults 5

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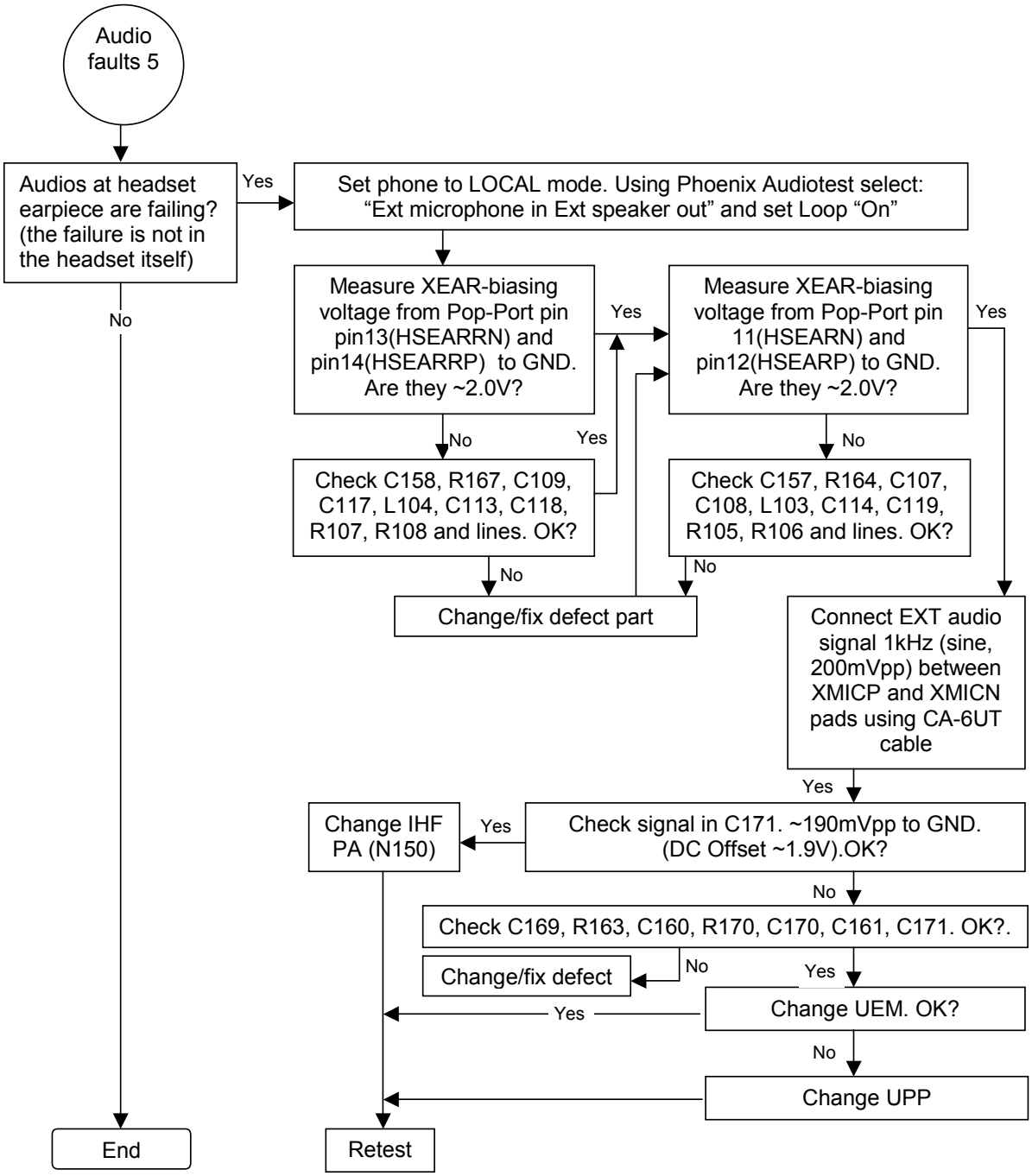
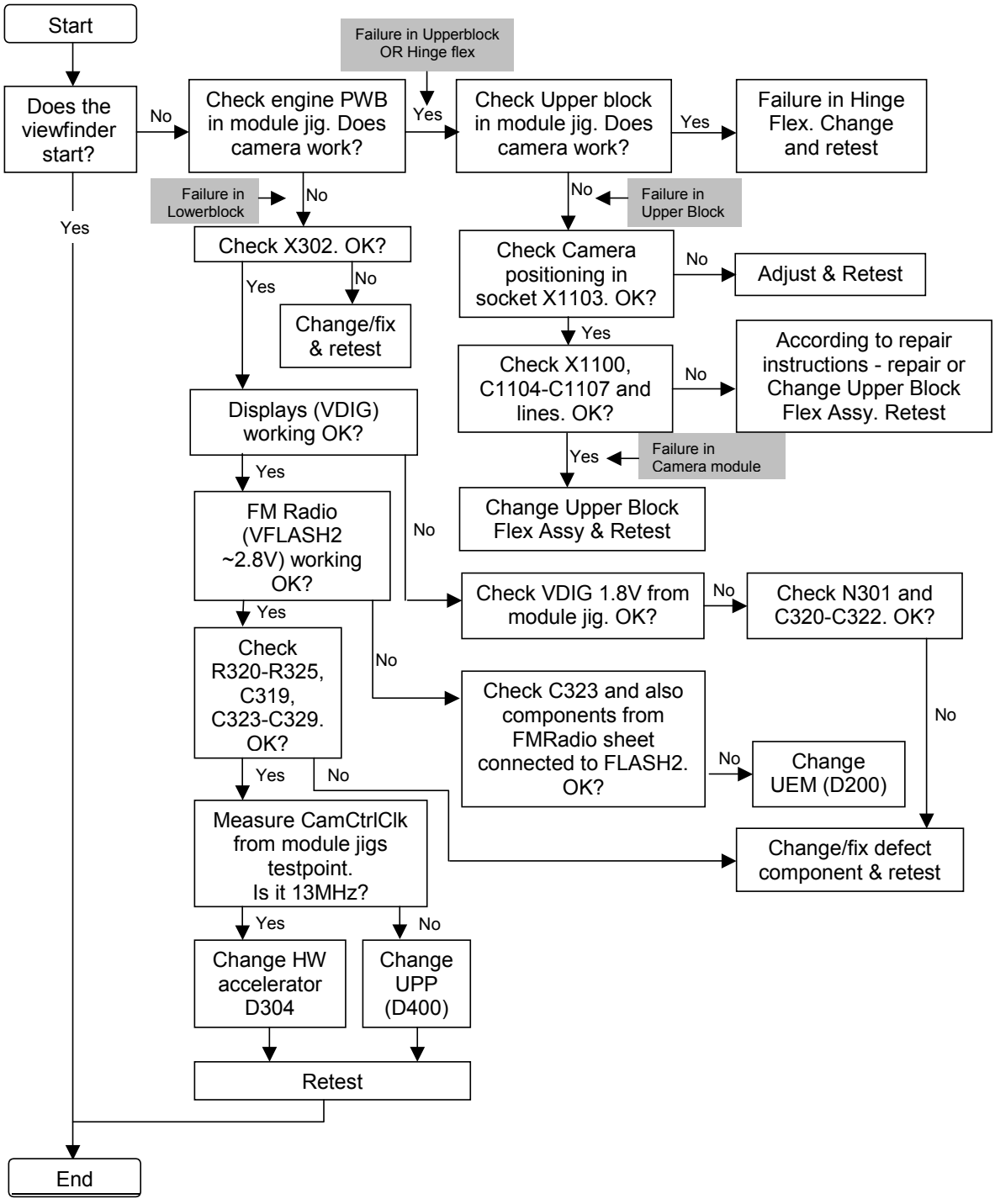
Audio fault (headset earpiece)

Figure 46: Audio (headset earpiece) failure troubleshooting


Audio faults 5
Audios at headset earpiece are failing? (the failure is not in the headset itself)
Yes
No
Set phone to LOCAL mode. Using Phoenix Audiotest select: "Ext microphone in Ext speaker out" and set Loop "On"
Measure XEAR-biasing voltage from Pop-Port pin pin13(HSEARRN) and pin14(HSEARRP) to GND. Are they ~2.0V?
Yes
No
Measure XEAR-biasing voltage from Pop-Port pin 11(HSEARN) and pin12(HSEARP) to GND. Are they ~2.0V?
Yes
No
Check C158, R167, C109, C117, L104, C113, C118, R107, R108 and lines. OK?
Yes
No
Check C157, R164, C107, C108, L103, C114, C119, R105, R106 and lines. OK?
No
Change/fix defect part
Connect EXT audio signal 1kHz (sine, 200mVpp) between XMICP and XMICN pads using CA-6UT cable
Yes
Check signal in C171. ~190mVpp to GND. (DC Offset ~1.9V).OK?
Yes
Change IHF PA (N150)
No
Check C169, R163, C160, R170, C170, C161, C171. OK?.
No
Change/fix defect
Yes
Change UEM. OK?
Yes
No
Change UPP
End
Retest

Camera fault

Figure 47: Camera failure troubleshooting



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FM Radio Troubleshooting

Notes to FM-Radio Troubleshooting:

- Use 1MHz 1X probe when measuring audio and clock signals with oscilloscope.
- Use active RF probe when measuring frequencies with spectrum analyzer.
- Use CA-6UT audio test cable to input FM Signal and force "Tomahawk Stereo Headset" on FM Radio Test Phoenix.

RF Test signal parameters:

- Amplitude, A, -67dBm
- Carrier frequency, f_c, 98.000MHz
- Deviation, f_m 75 kHz
- Modulating frequency, f_m, 1.000kHz (RF generator internal)
- FM Stereo, Mode R=L, Pilot state ON

Figure 48: CA-6UT

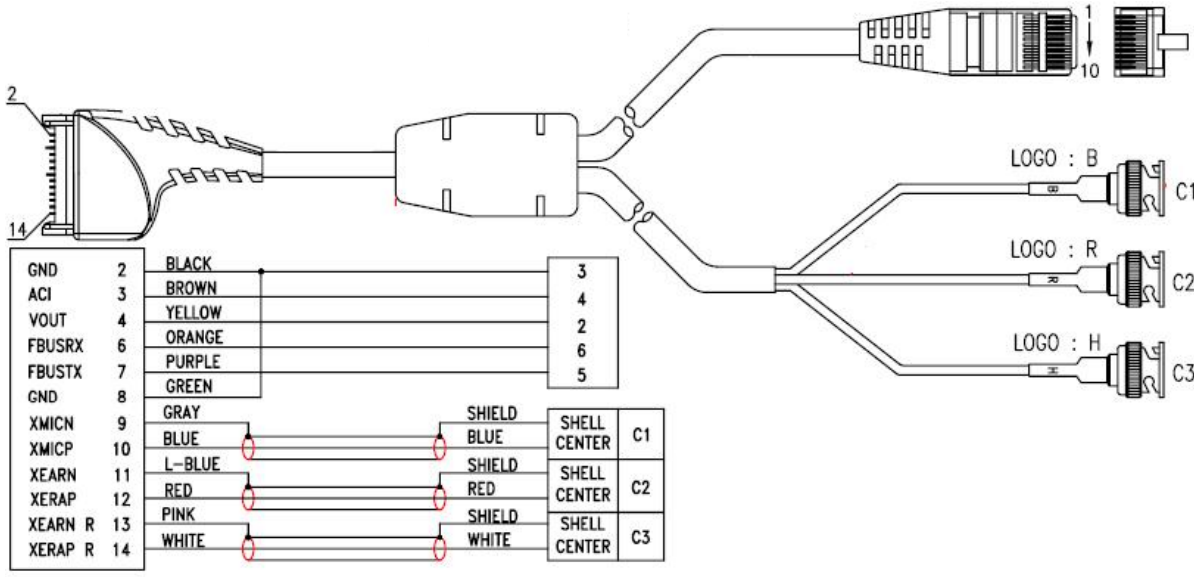
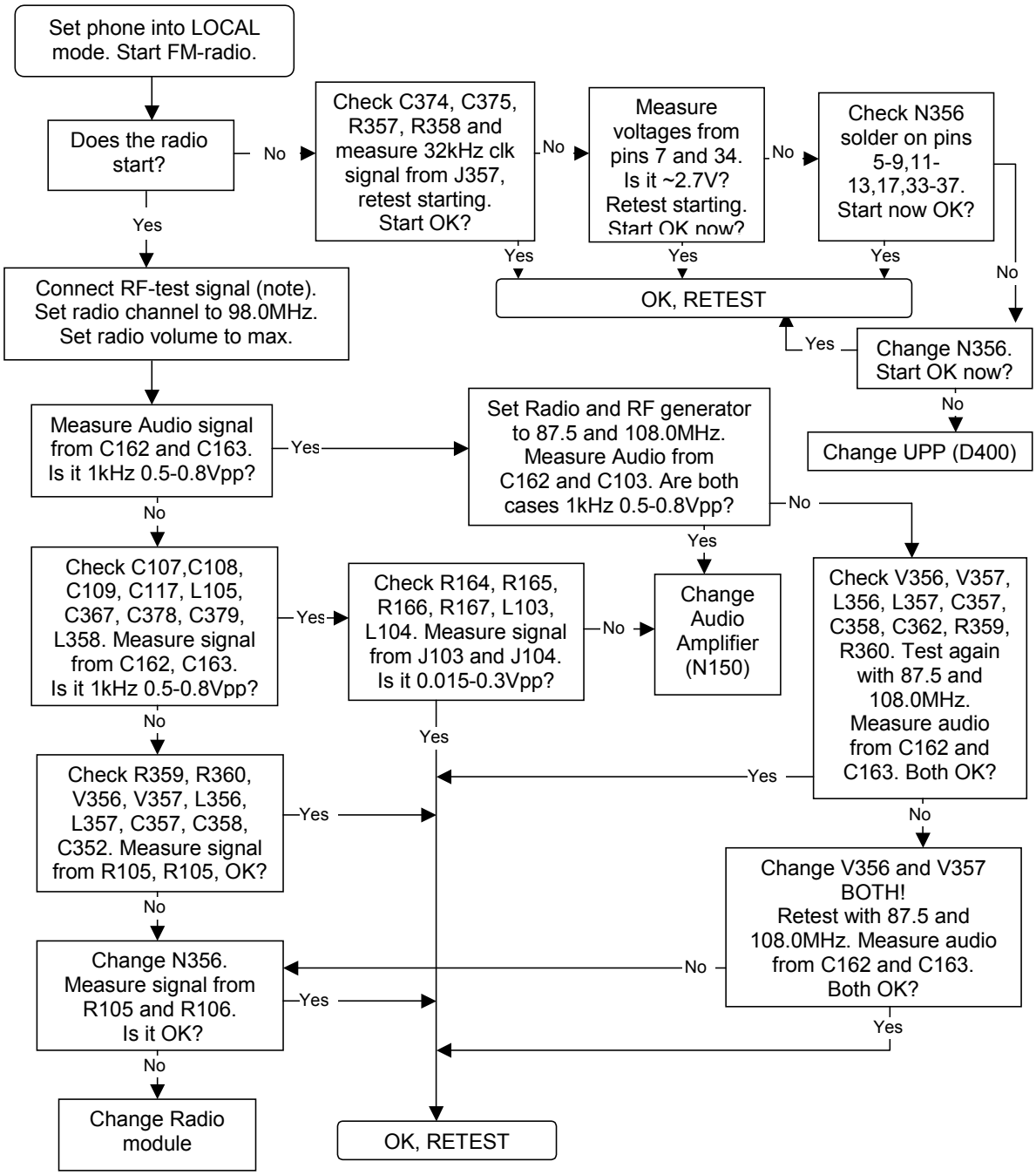


Figure 49: FM-Radio failure troubleshooting


Set phone into LOCAL mode. Start FM-radio.
Does the radio start?
No
Check C374, C375, R357, R358 and measure 32kHz clk signal from J357, retest starting. Start OK?
No
Measure voltages from pins 7 and 34. Is it ~2.7V? Retest starting. Start OK now?
No
Check N356 solder on pins 5-9,11-13,17,33-37. Start now OK?
Yes
Yes
Yes
Yes
No
OK, RETEST
Yes
Change N356. Start OK now?
No
Change UPP (D400)
Yes
Connect RF-test signal (note). Set radio channel to 98.0MHz. Set radio volume to max.
Measure Audio signal from C162 and C163. Is it 1kHz 0.5-0.8Vpp?
Yes
Set Radio and RF generator to 87.5 and 108.0MHz. Measure Audio from C162 and C103. Are both cases 1kHz 0.5-0.8Vpp?
No
Yes
No
Check C107,C108, C109, C117, L105, C367, C378, C379, L358. Measure signal from C162, C163. Is it 1kHz 0.5-0.8Vpp?
Yes
Check R164, R165, R166, R167, L103, L104. Measure signal from J103 and J104. Is it 0.015-0.3Vpp?
No
Change Audio Amplifier (N150)
Check V356, V357, L356, L357, C357, C358, C362, R359, R360. Test again with 87.5 and 108.0MHz. Measure audio from C162 and C163. Both OK?
No
Yes
Yes
Check R359, R360, V356, V357, L356, L357, C357, C358, C352. Measure signal from R105, R105, OK?
Yes
No
Change V356 and V357 BOTH! Retest with 87.5 and 108.0MHz. Measure audio from C162 and C163. Both OK?
No
Change N356. Measure signal from R105 and R106. Is it OK?
Yes
Yes
No
Change Radio module
OK, RETEST

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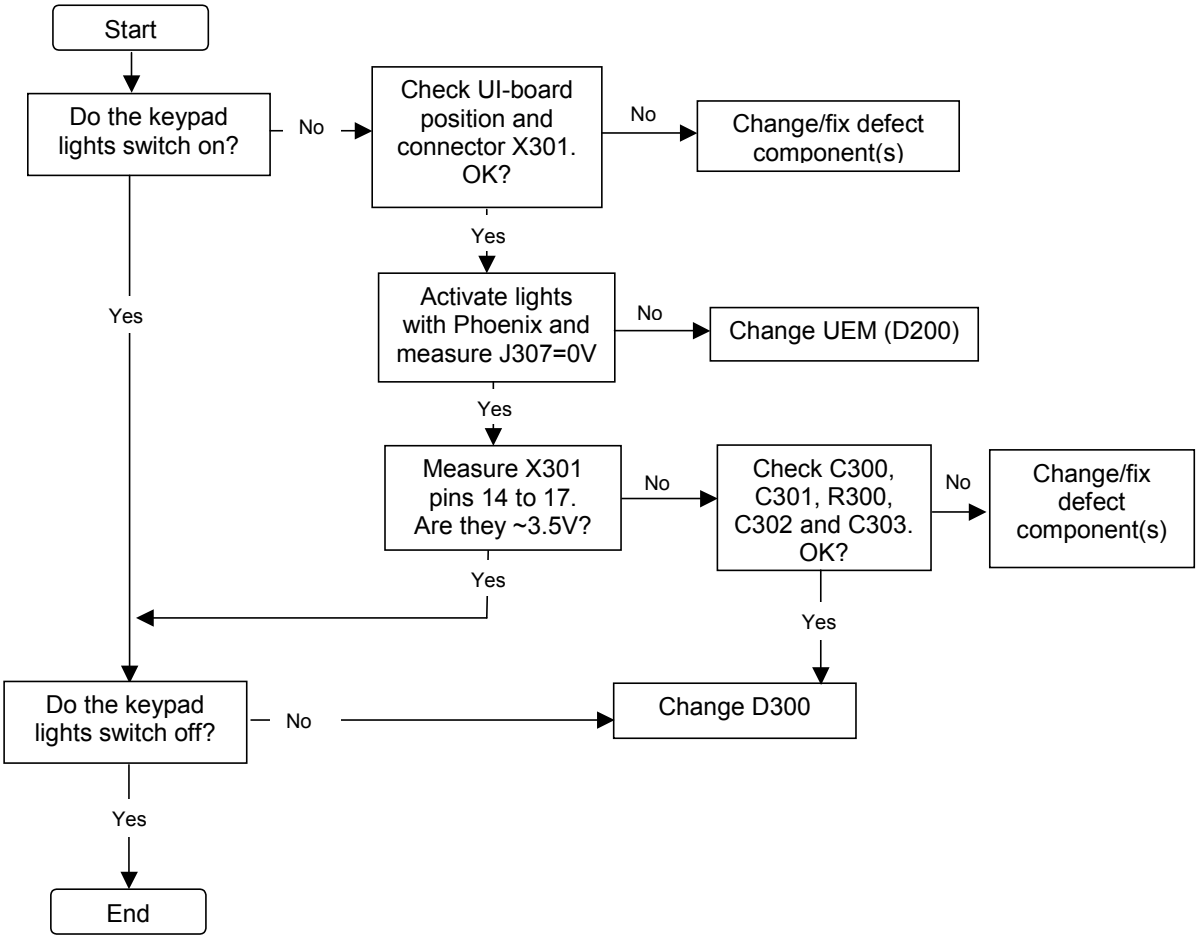
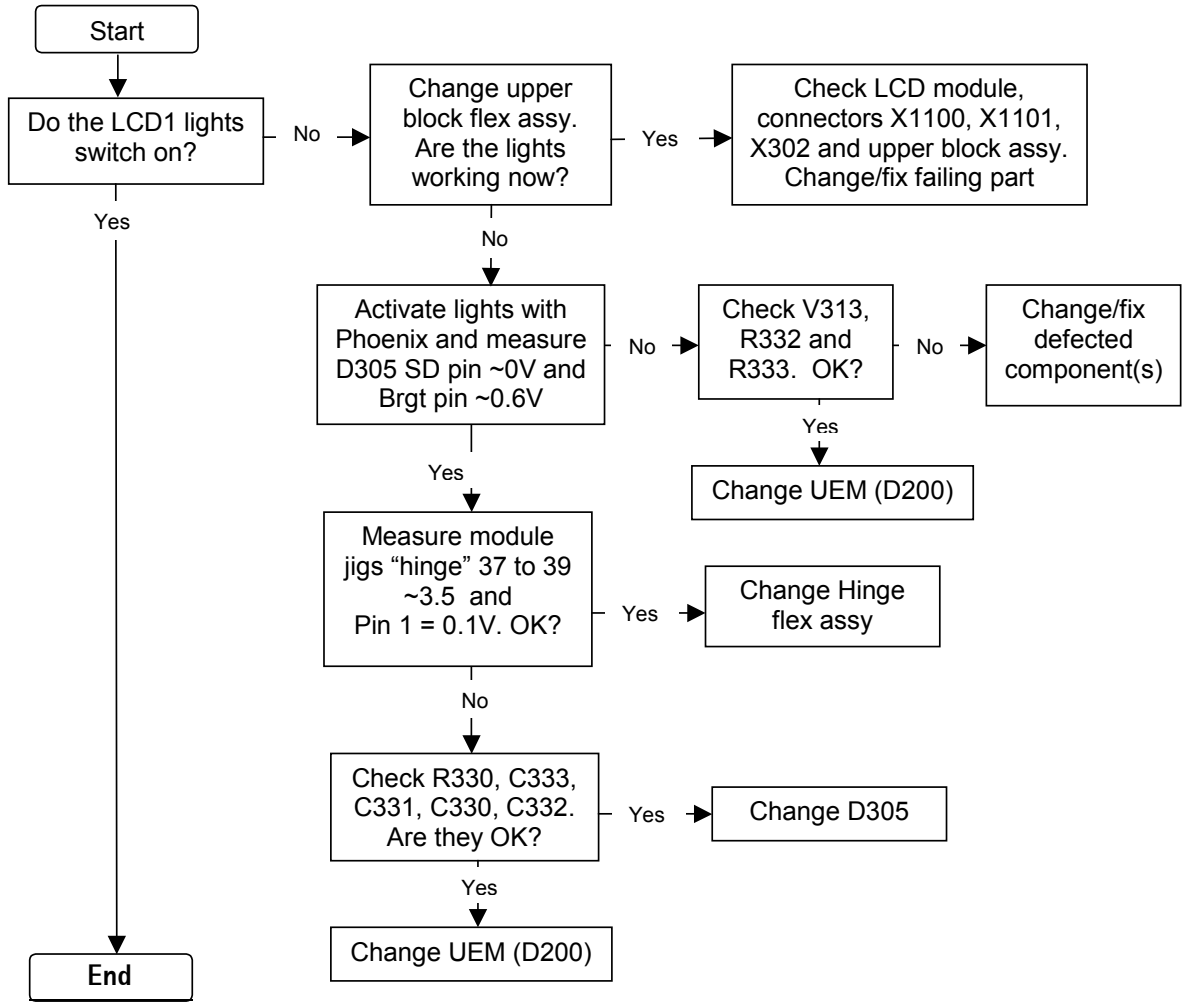
Keypad Illumination Fault

Figure 50: Keypad illumination troubleshooting



LCD1 Illumination Fault

Figure 51: LCD1 illumination troubleshooting



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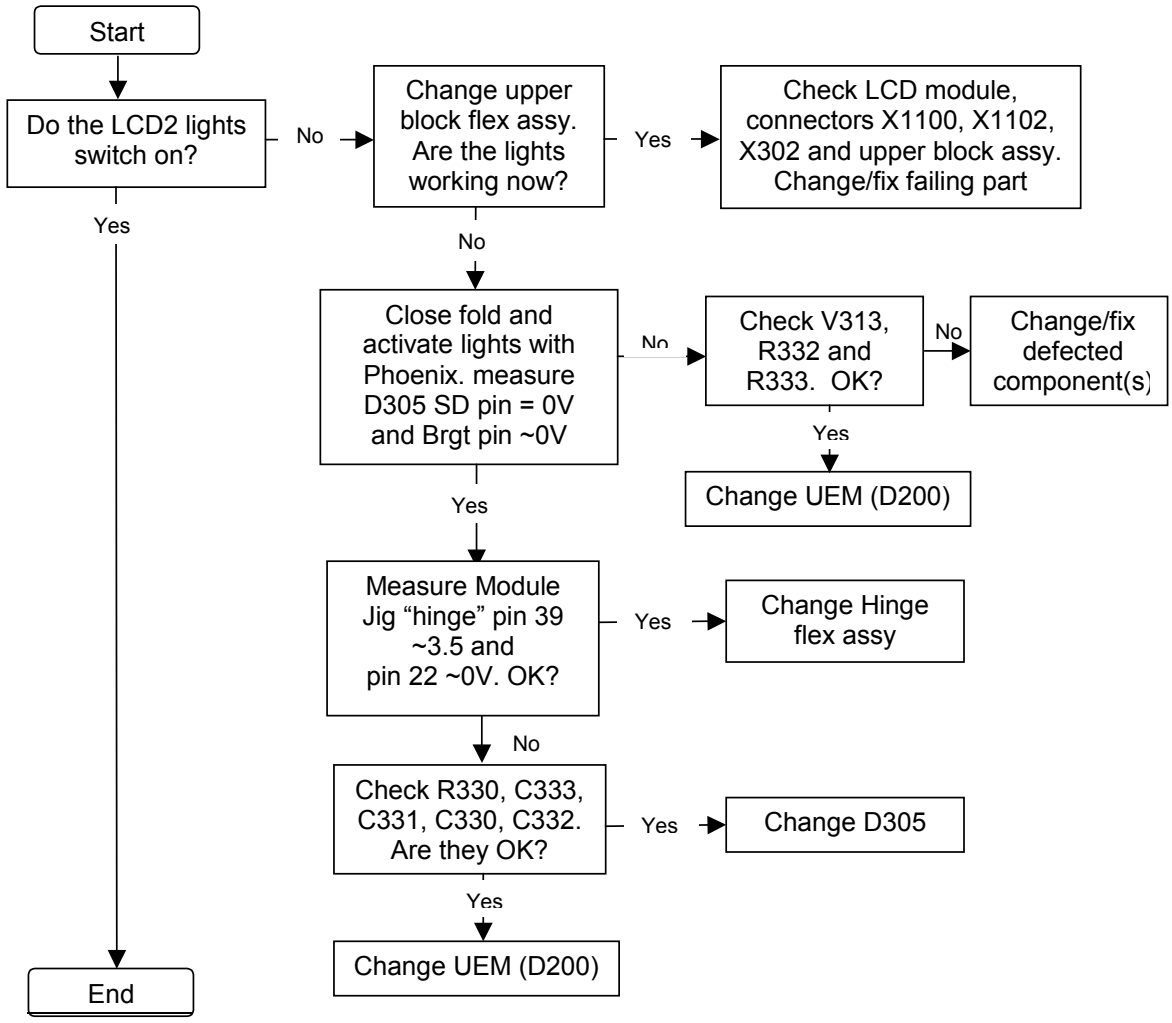
LCD2 Illumination Fault

Figure 52: LCD2 illumination troubleshooting


Start
Do the LCD2 lights switch on?
No
Change upper block flex assy. Are the lights working now?
Yes
Check LCD module, connectors X1100, X1102, X302 and upper block assy. Change/fix failing part
Yes
No
Close fold and activate lights with Phoenix. measure D305 SD pin = 0V and Brgt pin ~0V
No
Check V313, R332 and R333. OK?
No
Change/fix defected component(s)
Yes
Change UEM (D200)
Yes
Measure Module Jig “hinge” pin 39 ~3.5 and pin 22 ~0V. OK?
Yes
Change Hinge flex assy
No
Check R330, C333, C331, C330, C332. Are they OK?
Yes
Change D305
Yes
Change UEM (D200)
End

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